THE RUBBER AGE

ESTABLISHED 1917

COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

Vol. 34 DECEMBER, 1933 No. 3

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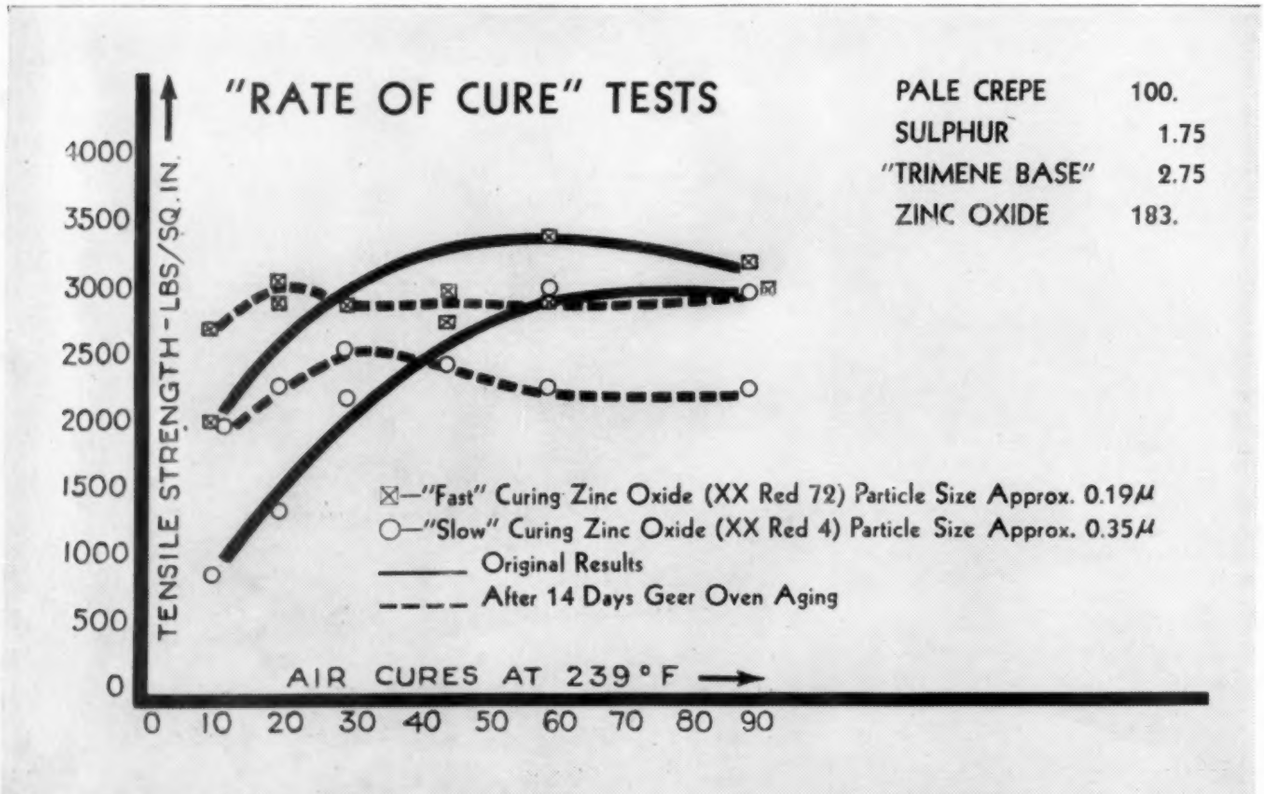

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CHLORINATED RUBBER

An Account of Research Work Recently Carried Out on This Controversial Subject, on Behalf of the Rubber Growers' Association

By DR. C. A. REDFARN

CLEARING the atmosphere about Chlorinated Rubber appears to be the order of the day. During the past summer considerable controversy was started in England when exceptions were taken to various statements made by Dr. W. Krumbhaar, director of the Institute fur Lackforschung, Berlin, in a paper presented at the Paint Research Station at Teddington, England. Lack of resistance to water and alkalis and poor adhesion were some of the faults of Chlorinated Rubber found by Dr. Krumbhaar and which provoked the greatest amount of discussion. Now comes an account of research work carried out by Dr. C. A. Redfarn for the Rubber Growers' Association, which reviews the history of this material, its properties and uses and its possibilities. This article, contributed to "Paint Manufacture" (London) answers some of the previous criticisms and gives Chlorinated Rubber its rightful place as a paint material. (EDITOR)

IT IS now almost impossible to deal with the subject of chlorinated rubber without referring to Dr. W. Krumbhaar. Since the, by now historic, occasion last May, when he "set the cat among the pigeons" at the Paint Research Station, Teddington, by describing illusions which he declared were commonly held with regard to the properties of chlorinated rubber, a lively correspondence has ensued in the various technical journals.

In connection with a research scheme financed by the Rubber Growers' Association, the writer has been enabled, for the last few months, to carry out some work on the properties and uses of chlorinated rubber, and ventures to offer a few of the conclusions as being of general interest.

As the name implies, chlorinated rubber is a compound of rubber and chlorine, the chlorine content varying from about 58 to 70 per cent. The material should not be considered from the point of view of the known properties of rubber *but as an entirely new compound*, since it retains very few of the characteristics of the original rubber. In fact, from its properties, it is more nearly related to the synthetic resins. There are several brands of chlorinated rubber on the market, ranging in appearance from a coarse pale yellow powder to a pure white fluffy substance. Most of the commercially available brands are of German origin, although recently British firms have entered this field. It should be noted that a chlorinated rubber, in the form of a hydrocarbon solution for use in the paint trade, has been manufactured and sold by a British company for some time past.

Work on chlorinated rubber was carried out as far back as 1859 (A. V. Newton, B.P. 2734). However, these early products were generally very unstable, readily losing chlorine on slight heating. The first commercial article appears to have been the material patented by S. J. Peachy, and sold under the name of Duroprene (B.P., 1894/1915). Chlorinated rubber, as it is sold to-day, may be regarded as a comparatively stable article, although the stability varies somewhat in the different brands.

It has been stated on the one hand by Dr. Krumbhaar (at Teddington), that the viscosity of chlorinated rubber decreases as the chlorine content increases, and on the other hand by G. S. Bache (O.C.T.J., 1/9/33), that the viscosity is independent of the chlorine content. A possible explanation of this diversity of opinion is that no two brands of chlorinated rubber have the same chlorine content, but the high viscosity member has a lower chlorine content than the low viscosity member of the same brand. This relationship might not hold if the high viscosity member of one brand were compared with the low viscosity member of another brand. From the higher chlorine content of low viscosity chlorinated rubber it would

seem evident that the low viscosity material should be less stable than the high viscosity material: this has been confirmed by experiment.

From tests carried out in an ordinary capillary melting-point apparatus, the decomposition points of the several types of chlorinated rubber, as indicated by the first signs of charring, lie between 170° C. and 180° C., complete blackening taking place at about 230° C. While this method is useful for rapid and approximate determinations, more accurate results are obtained by measuring the temperature at which an inert gas like nitrogen, after having passed over chlorinated rubber, causes a precipitate when bubbled through silver nitrate solution. The degree of stability can be measured quantitatively by weighing the amount of precipitate produced under standard conditions.

Chlorinated rubber lends itself readily to the production of cast films. These can be prepared by casting on to glass plates solutions made from three parts of chlorinated rubber, one part of plasticizer such as dibutyl phthalate, tricresyl phosphate, or a drying oil, and about twelve parts of benzene, toluene, or xylene. After drying, these films can be readily detached from the plates, and are about half as strong as viscose films of the same thickness, as determined by the bursting method on the Mullen paper tester. There is one important difference, however: whereas viscose films break sharply when the requisite pressure is applied, chlorinated rubber films stretch considerably before breaking. After twenty-four hours' total immersion in distilled water, plasticized chlorinated rubber films absorb about 7 per cent of moisture, at the same time becoming slightly turbid: on removal from the water the films rapidly become clear again. Viscose films under the same test absorb about 60 per cent of moisture and are more or less disintegrated.

From the relative ease with which straightforward plasticized chlorinated rubber films can be removed from glass plates, it is obvious that some modification is necessary for the production of lacquers for application to metal surfaces. Adhesion can be obtained by the addition of such substances as albertol, glyptal, and coumarone resin. Such lacquers can be applied by dipping, brushing, or spraying, although some difficulty is usually encountered when spraying because of the tendency of the lacquer to "cobweb." This trouble can be checked by adjustment of the spray-gun and by the addition of a little non-solvent such as alcohol or gasoline. Chlorinated rubber lacquers form good protective coatings for wood, metal, and plastic materials, which have to be exposed to a moist, acid, or alkaline atmosphere, because chlorinated rubber, unlike cellulose esters and synthetic resins, is not decomposed by acids or alkalis. The possibility of the plasticizer used in the lacquer not being so resistant as the chlorinated rubber to decomposition should not be overlooked. In order to get maximum protection the film of lacquer must be completely dried: this is a slow business, since chlorinated rubber is extremely tenacious towards the last traces of solvent.

Owing to the elasticity of the plasticized chlorinated rubber film, the opinion is offered that lacquers from this material should find a big field in the decorated leather industry, and tend to displace nitro-cellulose finishes, which have definite disadvantages when applied to leather. As a corollary, chlorinated rubber should be useful in the manufacture of leather-cloth.

Chlorinated rubber has been recommended for use in ordinary linseed oil paints, recipes for which purpose are given in booklets issued by suppliers of the material. Linseed oil itself plasticizes chlorinated rubber. Hence, in a paint film containing chlorinated rubber, as the linseed oil oxidizes and loses its flexibility, so the chlorinated rubber will become brittle. In order to counteract this, the addition of a plasticizer such as tricresyl phosphate or dibutyl phthalate is advised.

Since chlorinated rubber becomes plastic on heating, experiments were carried out in an injection molding press in order to ascertain whether products similar to those obtained from cellulose acetate could be produced. It was found that chlorinated rubber was not stable enough for this purpose, chlorine being set free and the surface of the mold attacked. It is possible, however, that a modification of the existing injection molding process, or the production of a still more stable chlorinated rubber, may overcome this difficulty.

It is perhaps unfortunate that chlorinated rubber has had an excess of publicity, with the result that too much is expected of the product. Cellulose acetate suffered from much the same complaint in its early days of industrial development, but it has settled down since, and has a useful place in industry: there are many indications that chlorinated rubber may be relied upon to do the same.

Compounds of Purified Rubber and Sulphur

THE dielectric constant, power factor, and conductivity of purified rubber and of a series of its compounds with sulphur were determined at temperatures from 75° to 235° C. The dielectric constant and power factor were measured at five frequencies from 60 to 300,000 ∽ and the apparent conductivity at about 0.002 second and at one minute after the application of potential. The results of the measurements are expressed in both tabular and graphic form. At 25° C. and 1,000 ∽ the dielectric constant of purified rubber containing no sulphur was 2.37. With increasing sulphur content the dielectric constant increased to a maximum of about 3.75 at 11.5 per cent sulphur, then decreased to a minimum of 2.70 at 22 per cent sulphur and again increased to 2.82 at 32 per cent sulphur. Under similar circumstances, the power factor increased from 1.6×10^{-3} for the rubber alone to a maximum of 93.8×10^{-3} for the compound containing 13.5 per cent sulphur; it then decreased to about 4.0×10^{-3} at 20 per cent sulphur, and again slowly increased to 5.1×10^{-3} at 32 per cent sulphur. The 1-minute conductivity was 2.3×10^{-17} mho/cm for the rubber alone. With 12 per cent sulphur, it was only 0.5×10^{-17}, while at 18 per cent sulphur it passed through a sharp maximum of 38×10^{-17}, and then decreased to values between 1 and 1.5×10^{-17} for compositions between 22 and 32 per cent sulphur. Changes of the temperature or the frequency at which the measurements were made shifted the maxima and minima in these curves and modified their heights. For example, at —25° C., the maximum dielectric constant at 1,000 ∽ was 2.8, and was obtained with a compound containing 4 per cent sulphur, while at 145° C. the maximum was 4.5 and was obtained for a compound containing about 26 per cent sulphur. Comparison of the results of this investigation on purified rubber with previous work done with crude rubber indicates that purification alters the values obtained for the electric properties, but it does not modify the general manner in which these properties vary with changes in composition, temperature, or frequency. The results may have practical bearing on the selection of rubber compounds for specific uses and in pointing out the manner in which the properties of rubber are related to temperature or frequency. (Abstract of paper by A. H. Scott, A. T. McPherson, and Harvey L. Curtis, published in Bureau of Standards Journal of Research, Vol. 11, August, 1933, and issued as Research Paper RP585, U. S. Bureau of Standards.)

Industrial Uses of Rubber Latex

A Summary of Uses to Which Rubber Latex Is Being Put in Many Manufacturing Processes

By D. F. TWISS

Part 1

THE following article is an excellent summary of the developments which have taken place in the use of rubber latex since interest in that material has become so widespread. Much has appeared in the technical press and elsewhere on various uses of latex but we believe the discussion by Dr. Twiss condenses in a few pages much information available only after long research. The article was originally presented as a paper read at a recent meeting of the Yorkshire section of the Institution of Chemical Engineers. Although the introductory paragraphs contain much historical information well known to our readers, it is retained here for its basic value. (EDITOR)

IT IS well known that although travellers of the 16th century recorded the fact that South American natives produced various rubber or rubbered articles with the aid of latex, rubber manufacture in civilized countries was originally based on the use of dry rubber. At first the balls of dry rubber, as received from South America, were cut to form various articles, *e.g.,* rings strips or sheets, and it was the need to reconsolidate the resulting scrap that impelled Thomas Hancock, the "Father" of the rubber industry, to the discovery of the mastication process in 1820. The alternative method of handling rubber for manufacturing purposes at that time was by forming a solution in a suitable solvent such as turpentine and to use this for waterproofing and similar purposes. The discovery of the mastication process led further to the observation that such masticated rubber dissolves much more easily than unworked rubber, and that the solutions obtained for any particular rubber content are much less viscous. Mastication, however, also results in changes which emphasize the shortcomings of raw rubber with respect to certain physical characteristics especially mechanical strength and the adverse effect of heat and cold. The need for artificial improvement of the quality of such rubber was satisfied by the discovery of vulcanization about 1842. It will be seen consequently that the position which developed in connection with the use of rubber in fluid form was in reality irrational. In order to make a satisfactory rubber solution, material obtained from a fluid latex of considerable rubber content, for example 35%, was dried, subjected to mechanical working—whereby its mechanical properties suffered—and dispersed in a rubber solvent producing a solution of lower rubber content and much lower fluidity than the original rubber latex.

It is easy to appreciate therefore, that the advantages of latex as a form of rubber for manufacturing purposes must frequently have been entertained by rubber manufacturers. Thomas Hancock himself in 1824 tried rubber latex for converting cheap fibrous material into an artificial leather, and he filed a patent for the process. It is of importance to note that this process actually preceded an alternative one patented by him in 1825 with the same aim, but using rubber solution. Unfortunately this latex process, together with other latex processes of Hancock for the impregnation and coating of ropes and cordage patented in 1825, and for proofing with latex patented in 1830, experienced an effective check through the inability to obtain substantial supplies of rubber latex.

Thomas Hancock was convinced of the practicability of latex transport, but was unfortunate in two respects. The small quantities of latex which he secured for his small-scale experiments appear to have been wrongly described to him as Hevea latex. Consequently when he appointed an agent in Tampico to export Hevea latex in bulk, the deliveries of the much less stable Hevea latex arrived repeatedly in a coagulated condition and necessitated abandonment of his latex processes. Also, only at the time of the writing of his memoirs many years later was he in a position to record the fact that ammonia had been found to be an effective preservative for latex, this discovery having been made about 1853.

The development of the plantation method of production of rubber permitted a greater degree of control than previously over the conditions of separation of rubber from the latex, so that the resulting product was of more uniform character than the range of various grades of wild rubber previously available and the rubber even in an unvulcanized —and unworked—condition already possessed fair mechanical qualities. This feature was emphasized a few years later by the use of unvulcanized crepe rubber for the soles of sports shoes and other footwear. The results emphasized the fact that the mastication process, although necessary as an intermediate stage in the existing methods of manufacture, is not in itself beneficial to the mechanical strength of the rubber, and that from this point of view the direct application of latex to the manufacture of rubber articles should enable the natural mechanical strength of the rubber to be realized more fully. It was probably for such reasons that there was about 1920 a renaissance of interest in the possibilities of latex. The number of patents for latex processes must now reach several thousands.

Types of Processes

In a paper such as this it is clearly not possible to deal at length with individual inventions and it must suffice to mention various types of processes illustrative of the underlying principles. A critical study of the patent literature (a useful selection from which is given in a recent booklet on "Rubber Latex," published by the Rubber Growers Association) will give additional detailed information.*

Somewhat surprisingly the reduction in the price of raw rubber of recent years has not been altogether favorable to the adoption of latex processes. A reason for this is that the small premium on the price of latex rubber for special handling and additional transport charges becomes a much greater percentage of the cost of raw rubber when the

* See also Marchionna's, "Latex and Its Industrial Applications." [Ed.]

latter is near 2d. a lb. than when it is 2s. per lb. On the other hand however, the reduction in the cost of raw rubber has increased the advantage of latex for purposes which cannot well be served by ordinary rubber and where latex has to compete primarily with non-rubber materials. By concentrating latex on the plantations it has been possible substantially to reduce its bulk and weight and consequently the transport charges and today the greater portion of the latex exported (nearly 10,000 tons of dry rubber in 1932) contains less than one-half its weight of water. The latex is transported mainly in steamer tanks (preferably wax-lined), in drums (of 40-65 gal. capacity), and in 4-gal. tins.

Technical Advantages

The main advantages of latex are as follows: (1) The rubber is available in a fluid condition without the cost and the ill-effects of mastication. The latex is easily used for purposes such as spreading or soaking; further it can be compounded without the need for heavy machinery involved in ordinary rubber manufacture. (2) Latex contains a much higher proportion of rubber than rubber solutions of equivalent viscosity. The proportion of volatile medium to be removed is therefore considerably less. (3) Not only is the cost of the rubber solvent eliminated, but the fire risk and health hazards of the common solvents are obviated. (4) Latex, by induced coagulation, readily yields solid rubber (admittedly wet) when required, whereas solutions normally have to be evaporated more or less completely. Articles can therefore be removed at an early stage from formers, moulds, etc., permitting the rapid return of these to the cycle of operations. (5) On account of the avoidance of the development of heat which arises in the milling of raw rubber, it is possible to use freely the most powerful accelerators of vulcanization in latex-compounding without fear of trouble from scorching or premature vulcanization. The low temperature of eventual vulcanization permits the use of bright organic pigments which would be discolored in ordinary heat vulcanization. (6) The latex rubber products normally contain a full proportion of the natural anti-oxidant constituents of the latex and so, *ceteris paribus*, show better ageing qualities in addition to the greater mechanical strength arising from the unworked condition of the rubber.

Features of latex constituting possible disadvantages are: (1) The need of a small portion of some form of preservative or stabilizing agent, *e.g.*, 0.5% of ammonia or 1% of potassium hydroxide. (2) The need for removal of water at some stage of manufacture. (3) The lower stability relative to rubber solutions, for example, for storage. On the other hand this lower stability is a distinct advantage for some operations. (4) The incorporation of reinforcing agents to the full effect of the latter is at present more difficult than with dry rubber.

Modifications of Rubber Latex for Manufacturing Purposes

Compounding.—In view of the fact that rubber for commercial purposes is generally required in a vulcanized condition, it is customary to use latex more or less compounded. Compounding is easily effected by adding the materials after wetting or dispersion in water. Sulphur, accelerators, and the usual powders are easily incorporated in this way. It is important that they should at least be wetted before incorporation. It is further desirable that they should be made faintly alkaline preferably with a small quantity of ammonia. As a still further refinement they may be added in the form of colloidal, or almost colloidal, suspensions, in which case a small quantity of a dispersing or stabilizing agent, such as casein, gum arabic, or gelatin, may be mixed with them. Colloid mills are of use in this connection, but mainly to insure complete wetting of the powders and the effective disintegration of the agglomerates before addition to the latex. A ball mill can effectively aid the wet dispersion of powders for latex-compounding. Precipitable powders such as barium sulphate may even be formed in the latex itself using the latter as the precipitation medium. Oils, bitumens, etc., also are introduced in the form of colloidal dispersions, the production of which is generally assisted by a small percentage of ammonium soap and is facilitated by the use of a colloid mill. Some compounding ingredients which are otherwise difficult to disperse satisfactorily, *e.g.*, certain anti-oxidants, can be dissolved in the oils before these are emulsified. Fatty acids, such as oleic acid or stearic acid, are desirably introduced in the form of their ammonium salts, the acid being eventually liberated by the substantial loss of ammonia during drying. By compounding *before* concentration, exceptionally uniform and permanent dispersion of compounding ingredients is possible. In the production of thin rubber goods it is possible to introduce rubber-soluble compounding ingredients, especially accelerators of vulcanization, by diffusion, *e.g.*, from an aqueous solution or dispersion into the unvulcanized article; this procedure of course is equally applicable to thin articles made from sheet rubber or rubber solutions. In the following discussion the term "latex" will frequently be used to include latex suitably compounded with vulcanizing agents, pigments, and other modifying ingredients.

Adjustment of viscosity and concentration.—For many purposes, for example, for spreading or dipping, natural latex although containing about 35% of rubber may be inconveniently fluid; it may for this reason permit sedimentation (or creaming) of compounding ingredients. To prevent this the viscosity can be increased by several methods, of which the following are typical:

Methods of Increasing Viscosity

(1) The use of colloidal materials such as albumin, gum tragacanth, or even milk for this purpose was protected by patent as long ago as 1855. It is possible that in the case of milk, in addition to the effect of casein, the thickening occurs to some extent by absorption of fat by the latex globules. The addition of rubber solvents to latex can also effect a thickening. In other cases powders such as clay or bentonite may be added in such proportion as to render the latex so thick that it may even become thixotropic. Other thickening agents such as zinc oxide and certain zinc salts appear to act by causing partial coalescence of the rubber globules. Reference must here be made to the important possibility of modifying the surface tension of latex and increasing its wetting and penetrative power towards fabrics by the addition of a small proportion of colloidal material of the "wetting agent" type, certain complex organic sulphonates being particularly powerful.

(2) A simpler and generally more satisfactory method for increasing viscosity is by concentration. By centrifuging in a special separator, concentrate is today being produced of 60% rubber content. The centrifuging incidentally serves to effect purification from foreign suspended material. Dunlop 60% latex (also marketed as "Jatex") is so produced.

Creaming may also be expedited by special agents such as gum tragacanth or ammonium alginate, the effect being presumably analogous to that of sedimentation of wine by colloids such as isinglass. With small additions of the creaming agent static latex in the course of a few hours gives a cream containing 60% or so of rubber; the presence of the additional creaming agent is not serious for many purposes. "Lotol" is a concentrate of this class. Filtration has been successfully applied on an experimental

scale in Italy to the production of latex concentrate. Evaporation, either before or after compounding, provides another method for producing a thickened latex (*e.g.*, Revertex) for manufacturing purposes.

(3) Minor adjustments of the viscosity are possible also in other ways, *e.g.*, by variation in the degree of alkalinity of the latex.

Vulcanization.—Instead of applying compounded latex to the primary production of an unvulcanized rubber article which is vulcanized in a subsequent operation, generally after drying, it is possible to effect vulcanization even in the aqueous dispersion itself (P. Schidrowitz, 1921). If stabilized latex containing sulphur in dispersion is heated to vulcanizing temperature the individual rubber globules actually become vulcanized. On subsequent removal of the water, for example, by evaporation, the vulcanized globules coalesce to form a continuous rubber mass. It is convenient for such vulcanization of latex to make use of powerful accelerators of vulcanization, also in a state of dispersion or solution, in order that the vulcanization process may be capable of occurring below 100° C. If the vulcanization process is carried too far not only is there a danger of impaired ageing in an over-vulcanized article, but the coalescence of the rubber globules on drying is less complete and the rubber product may show signs of "shortness."

In view of the ease with which latex can thus be vulcanized, the difficulty of introducing reinforcing agents inside the rubber globule without some degree of milling appears somewhat surprising. The essential difference, however, doubtless lies in the solubility of sulphur in rubber, whereas the particles of agents capable of reinforcing rubber are not soluble in that medium but nevertheless need to be very intimately dispersed therein.

Effecting Incipient Coagulation

Flocculation.—Although rubber latex for most technical purposes not only contains a preservative such as ammonia, but also is additionally stabilized by the addition of suitable colloids in small proportion, such as casein or ammonium soap, coagulation for some purposes may occur with inconvenient ease, *e.g.*, ordinary latex is difficult to mix intimately with some powders and also with certain fibrous materials on account of a tendency to localized or irregular coagulation. This feature can be obviated by effecting incipient coagulation so as to produce a still fluid dispersion, or even paste, of coarser particles in which the sensitiveness towards formation of a continuous coagulum is no longer present. Indeed the resulting flocculated latex can be regarded as a fine dispersion of rubber coagulum. Flocculation can be effected in a number of ways, generally by the use of a carefully selected coagulant under adjusted conditions; a solution of an aluminum salt has often been used. Such flocculated latex or "latex precipitate" can be used with especial advantage for mixing with fibres for the production of rubberized fibrous dispersions, which by filtration, screening, or other means of consolidation can be formed into sheet or other convenient shape. By combining in this way rubber and disintegrated textile or leather waste it is possible to make an artificial leather or leather substitute of attractive properties. A mixture of asbestos and rubber so produced can be consolidated for brake-linings. Indeed the possible applications of such "latex precipitate" are numerous. Furthermore, it can be freed from saline or other undesired soluble constituents by washing, *e.g.*, by decantation or other convenient means.

Crumbing.—If the flocculation of latex, especially of highly compounded latex, is carried further, a wet crumb-like mass is obtained which can be dried to form a compounded rubber powder. Such compounded rubber crumb can also be produced by simultaneous compounding and coagulation, for example, by successively adding to ordinary latex two reagents such as sodium silicate and magnesium sulphate. On addition of the second reagent a fine precipitate of compounding ingredient is formed concurrently with flocculation of the rubber globules, and a discontinuous crumb-like mass is obtained. The dried products can be used for manufacture of soft rubber and also ebonite articles by a simple moulding operation in the same way as an ordinary moulding powder.

Methods of Use

The methods by which latex may be used in manufacture fall generally within the following group of processes: spreading, soaking, spraying, dipping, electrophoresis, gelling, frothing, flocculation, crumbing, and moulding. These terms are used in a wide sense, for example, spreading and dipping cover, also such uses as the application of latex either as an adhesive for assembling in boot and shoe manufacture or as a bonding agent for abrasive or other materials.

Some applications of latex, for example, proofing by spreading, simple bonding of abrasives and asbestos or other fibres and the provision of anchorage for the pile of carpets and the bristles of brushes, although offering advantages, are so obvious in theory that the processes instanced below are those with special features or illustrative of various principles. The order of consideration is not selected to bear any relation to the degree of present technical importance.

Anode process.—This interesting process is based on the well-known electrophoretic movement of the particles in a colloid suspension when subjected to electric stress between two electrodes. The rubber globule normally carries a negative electric charge and so normally tends to migrate towards the anode; hence the term "anode process." (It is possible, *e.g.*, by acidification in the presence of an appropriate stabilizing agent, to make the rubber globule assume a positive electric charge and to reverse the direction of the electrophoresis so that migration occurs to the cathode. Such cathode-deposition of rubber is not found in technical application.) In the passage of an electric current through compounded latex there is naturally a tendency for any electrolytes present to carry much of the current. This not only increases the liability to liberation of gases at the electrodes, the anode of course being the more important in the present consideration, but also reduces the yield of rubber deposited per unit of current.

The so-called "deposition factor" given in terms of grams of dry rubber per ampere-minute of current in good practice may exceed 3. It is therefore desirable to reduce the electrolyte content before using latex for electrophoretic manufacture and also incidentally as far as possible to insure that such residual electrolytes as are present are not unduly prone to cause anodic gassing with reasonable voltages. Ammonia-preserved latex consequently is superior to caustic-alkali preserved latex because of the ease with which the ammonia can be substantially removed either by evaporation or aeration or even by the careful addition of formaldehyde which converts it into hexamethylenetetramine. From the point of view of freedom from electrolytes the concentration of latex by centrifuging has advantages for electrodeposition. Concentration in itself is not a highly important matter for the anode process, but centrifugally concentrated latex on re-dilution to the rubber content of normal latex naturally shows a distinctly lower proportion of saline serum substances. For the more complete removal of natural saline constituents of the serum and of any caustic alkali preservative, dialysis can be used.

The "anode" process can be applied equally well to the production of permanent protective rubber or ebonite coatings, *e.g.*, on metal wire screens, ships' fittings, etc., and to the manufacture of rubber articles.

[*To Be Continued*]

Thiokol in Printing Blankets, Engravers' Rubber and Sheets

By JOHN P. BUSHNELL

SINCE the time of the first crude printing presses to the modern giant rotary, pressmen have encountered problems in the proper impressing with plates, rollers and printing blankets. Often the fault has been the press, but only too frequently it has been in the physical construction of the plate, roller or blanket.

Rubber rollers and blankets have been used for a number of years, but many advantages are claimed for the new blankets now being made with Thiokol. One of the first rubber manufacturers to use this material in printing blankets is the Vulcan Proofing Company, Brooklyn, N. Y.

Rubber blankets have been found to have certain distinct disadvantages. Research work on rubber blankets by the Lithographic Technical Foundation of America was made a few years ago and it was noted in their report that the blanket swelled through the absorption of oil from the printing ink. The absorbed oil ultimately oxidized with a simultaneous oxidizing action on the part of the rubber, resulting in a sticky, plastic mass. The imperviousness of the "Thiokol" blanket to oils in printing inks and cleaning solvents, gives them a very practical advantage in this respect.

Printing blankets must have resilience, softness, pliability and be oil resistant. Resilience is that quality which will allow the blanket to spring back under pressure. Uniformity in this resilient property is of the utmost importance,—every square inch of the blanket must carry the same degree of resilience. Softness is that quality which makes the blanket impressionable and at the same time prevents rapid surface wear. Pliability is that quality which allows the blanket to follow the contour of the cylinder and eliminate "running in." Unless the surface coating of the blanket has this pliability it will soon crack. As to the oil resistant quality of effective blankets, much has been written and it is a subject on which much is still misunderstood, but today it can be laid down as a practical principle that the surface of effective printing blankets must be oil-proof.

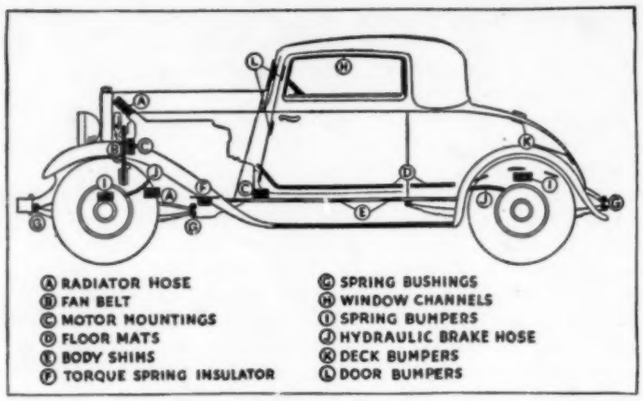
It is claimed that the new Thiokol blanket meets all these qualifications. Because of the resiliency of Thiokol coatings there is no tendency towards "ghosting," which term applies to surface indentations. "Ghosting" is a problem with other surfaced blankets and has caused considerable trouble in printing, especially where a half tone or line cut is printed on the same spot where type was in a previous run.

Rubber blankets frequently have to be cleaned of ink and the rubber surfaces are often further damaged by the washing fluids used, such as turpentine, gasoline, benzene and some patented washes.

Two other products manufactured by the Vulcan Proofing Company, which have Thiokol as a base, and which are particularly interesting to the printing trade, include the new "Vulcolastic" engravers' rubber for hand cut plates, and "Tympan" sheets for use on direct presses. The new composition plate, impervious to oils and driers, is capable of consistently standing up on exceptionally long runs. The surface texture of "Vulcolastic" is especially fine and the material will not pit.

Use of Rubber in Automobiles

WITH increasing use of rubber parts for automobiles, yearly output of from 30 to 40 rubber trees is required to supply tires, tubes and parts for each modern car, according to Goodyear research engineers.



A few of the numerous places where rubber is used in the modern automobile (other than in tires and tubes) are shown by the blacked-in spots on the accompanying drawing.

In 1925 the average car used about three pounds of rubber parts in addition to the rubber in tires and tubes, while 1933 models carry from 30 to 60 pounds of rubber parts. More than 90 per cent of modern automobiles use at least 30 to 40 pounds of rubber made up into 11 or 12 classes of parts, ranging from spark plug caps and door bumpers to torque spring insulators and engine mountings.

Improvement in engines and fuels together with the introduction of new silent running tires making for extremely quiet operation, have necessitated use of rubber insulation to reduce body noises formerly drowned out by engine and tires. Rubber insulation is also important in breaking up synchronization of vibrations and noises between engine and body caused by high speed performance and use of all steel bodies.

Prominent among uses for rubber in automobiles other than in tires and tubes are floor mats, fan belts, spring bumpers, window channels, bushings, body shims and hydraulic brake hose.

Unlimited possibilities for additional rubber parts in the automotive field are seen by Goodyear engineers. In a few years, they believe, more and more rubber will be used in body and fender construction. It is entirely possible that there will be more replacing of solid steel parts with rubber, perhaps replacing the car's entire spring mechanism with rubber.

Compressometer

THE instrument provides a convenient means for measuring the thickness and the change in thickness of a textile or similar material when it is subjected to increasing or decreasing pressures. The foot of the instrument can be lowered or raised by means of a rack and pinion acting through a helical spring. The pressure applied to the specimen by the foot is indicated on a dial micrometer and the corresponding thickness of the specimen on a second dial micrometer. Readings are taken under increasing pressures and then under decreasing pressures.

Curves for the compression and recovery of several materials are shown. Definitions are proposed for the terms thickness, compressibility, and compressional resilience as applied to textiles. The results of tests on rug underlays, blankets, felts, on knit, woven, and pile fabrics, and on sheet rubber and paper are given. (Abstract of paper by Herbert F. Schiefer, published in Bureau of Standards Journal of Research, Vol. 10, June, 1933, and issued as Research Paper RP561, U. S. Bureau of Standards.)

The Safe Use of Carbon Tetrachloride in the Rubber Industry

By LEON J. D. HEALY

Consulting Chemist and Engineer, Milwaukee

THE subject of this paper implies that there is a hazard involved in the use of carbon tetrachloride. There seems to be a considerable difference of opinion amongst various investigators as to whether the use of carbon tetrachloride involves any hazard. The writer has friends who have handled this chemical for years and who claim that there is no hazard whatever involved in its use. On the other hand, I know of others who are just as positive that a serious hazard is involved in its use.

Published data on the subject is quite confusing and often contradictory. The situation is quite well summed up by Dr. F. R. Brunot of the United States Public Health Service, Bureau of Standards, Washington, D. C., at the last annual congress of the National Safety Council. Quoting from the discussion at the Rubber Section, Dr. Brunot said that his rather superficial study of the matter has led him to believe that a number of people interested in carbon tetrachloride adhere to one or the other of two diametrically opposed beliefs: First, that the chemical is a non-toxic agent under any and all conditions; and the other group believing, secondly, that it is so highly poisonous as to be dangerous for any use. "Of course," said he, "the truth lies in the mid-ground between these two opposing ideas." It was his impression, based upon work carried on with animals, that carbon tetrachloride properly used cannot be considered a product dangerous to health. "The sensible way to look at the whole situation is to recognize that carbon tetrachloride is toxic in high concentrations, quite possibly dangerous in the middle range, and in all probability so slightly harmful in small concentration as to make the damage done negligible. It then becomes simply a matter of using the chemical in such a way as to avoid the danger zones."

Up to the present time there is comparatively meager published data on the true physiological effects of varying exposures to carbon tetrachloride at different concentrations.

Sometime ago the National Safety Council considered seriously conducting a research on all phases of the carbon tetrachloride problem. Because of business conditions and other important factors, it was decided to hold this research in abeyance. Considerable work, nevertheless, has been done along these lines by individual investigators and without doubt the results of some of this valuable work will shortly be published.

The writer has had experience in handling many thousands of gallons of carbon tetrachloride during the past dozen years and on several occasions has personally experienced the toxic effects of this chemical. He can readily understand why there are contradictory opinions on the subject because the physiological effects are not very marked where concentrations of the vapors are low or exposure is of short duration and any ill effects could easily be laid to some other disorder of the system. But it is the writer's sound belief that any person who has had extended experience in the handling of carbon tetrachloride under varied conditions, will readily admit that there is a hazard involved in the promiscuous or unintelligent use of this material. Please note that I have qualified the hazard as conditional upon how it is used.

Toxic Substances Can Be Handled Safely

Several years ago in a paper on the "Toxic Properties of Chemicals Used in the Rubber Industry" presented by the writer at one of the National Safety Conferences, the writer made the statement that practically any chemical substance, even if highly toxic, could be safely handled in industrial work provided that its toxic and other chemical properties were understood and the material was handled in an intelligent manner. The writer still stands by that statement. We know conclusively that there is some element of danger involved in the unintelligent use of carbon tetrachloride and knowing that fact, certain precautions should be taken to insure the safe handling of the material.

Although there is a lack of published data covering all phases of the physiological effects of carbon tetrachloride, nevertheless, the chemical and physical characteristics of this chemical compound are well understood and sufficient knowledge is at hand, which if used intelligently, can overcome any serious hazard involved by the use of this chemical in the rubber industry.

For the benefit of those less familiar with carbon tetrachloride let us review briefly some of its major properties. Carbon tetrachloride is at normal temperatures and pressure, a clear, colorless mobile liquid having a peculiar aromatic color somewhat resembling chloroform. When pure, the odor is not unpleasant; but some commercial grades have a rather pungent odor due to traces of impurities. The liquid is very heavy, being approximately 60% heavier than water with a low boiling point of 170 degrees F. and freezing point of 9.4 degrees F. Chemically, it is a chlorinated hydrocarbon in which one part carbon is combined with four parts of chlorine, (CCl_4). It is non-inflammable and does not support combustion. The chief characteristics of this compound which make it so useful in the rubber industry are: its low boiling point, its rapid evaporation, its non-inflammability and its excellent solvent properties for rubber, gums, and other organic substances used in the manufacture of rubber.

* Presented before Rubber Section, 22nd Annual Safety Congress, National Safety Council, Chicago, October 3, 1933.

The commercial grades as now manufactured are usually very pure, containing not over .0015% residue on evaporation and not more than 0.1% carbon bisulphide. The C. P. grades have a residue of less than .005% and not over .005% of carbon bisulphide. So the dangers from impurities are nil. There is no hazard from fire or explosion since the vapors are neither inflammable or explosive.

Carbon tetrachloride has milder physiological effects than many of the other solvents used in the rubber industry, notably for instance, carbon bisulphide, benzole, chloroform, and coal tar solvents. Furthermore the odor is not so disagreeable, its vapors are non-irritating and it does not promote coughing in low concentrations. However, prolonged exposure to carbon tetrachloride vapors of high concentrations may bring about serious physical disturbances marked by drowsiness, headache, nausea and possibly irritation of eyes, nose, and throat. Moderate exposure seldom shows serious symptoms although some persons appear to be more susceptible than others. Effects resulting from less serious exposure usually are rapidly overcome by fresh air.

Cases of Chronic Poisoning

Quoting from Hamilton (Industrial Poisons in the United States), he says: "Chronic poisoning occurs sometimes in rubber works . . . I have never found a case of very serious poisoning from this source, although in three rubber factories I found men complained that their health had begun to suffer from exposure to fumes. Nausea, loss of appetite, loss of weight, irritation of eyes, nose and throat and inflammation of the skin of hands and forearms were symptoms they described." In this connection, there is no information as to the nature of the exposure nor the time required for the symptoms described to show up. From the writer's observations in the use of carbon tetrachloride in the rubber industry, the symptoms just described were no doubt produced by daily exposure to relatively high concentrations or to poorly ventilated rooms. Such symptoms often show up in cold weather when windows are kept closed.

The writer recalls a case not long ago where eight girls were set to work repairing some defective goods during which operation carbon tetrachloride cement was used. These girls were seated at several small tables in one corner of a large high ceilinged room and each was given a small can of cement and brush. Late in the afternoon the forelady reported to me that most of the girls complained of headache and that two were somewhat nauseated. Upon investigating we found that while the room had all the appearance of being well lighted and ventilated, the heavy carbon tetrachloride vapors had settled in the corner where the girls were working. The windows were closed on account of cold weather and the vapors had not escaped. The windows were opened and the room ventilated and the next day none of the girls complained of any further bad effects. This is an illustration where the job was not a regular one and no thought had been given to the matter. It goes to show, however, that the peculiar heavy suffocating vapors of carbon tetrachloride can cause trouble even when used in small quantities if they are allowed to accumulate and this they assuredly will do if not sufficient air is stirring to dissipate them.

At the last National Safety Congress, Dr. J. Newton Shirley, in a paper entitled "Is Carbon Tetrachloride a Health Hazard as Used in the Rubber Industry?" described some of the more recent cases of carbon tetrachloride poisoning and especially the physiological effects of several cases which had come under his personal observation. He described both the effect of carbon tetrachloride upon the flesh and when taken internally through the mouth or inhaled. In the first instance, Dr. Shirley states: "We first note that when used externally, it causes a sensation of warmth and smarting to the skin as noted with chloroform. I have never seen this go on to blister formation when prolonged exposure occurs. Since this is an excellent fat solvent, it will quickly remove the normal oily and greasy secretion of the glands of the skin, leaving the surface exposed to chapping and drying out. Such a condition may allow secondary infection to take place. . . . I have never seen what I could call an infection from its use in this way. There is evidence to believe that carbon tetrachloride can be absorbed through the skin because of its high affinity for fat. I can find no record of a toxic condition resulting from such absorption alone."

Again quoting Dr. Shirley, "Now, you may say that consideration of the toxic action of carbon tetrachloride when taken by mouth is not important, but I will call your attention to this as I consider that the most dangerous toxic effect of exposure to lower concentrations of carbon tetrachloride vapors may be due almost entirely to that amount of carbon tetrachloride which is absorbed by the saliva and swallowed. This enters the system as though it were injected." . . . "Turning to the inhalation of carbon tetrachloride vapors, we enter the main source of danger insofar as the rubber industry is concerned. Fairly concentrated fumes cause smarting and burning of the eyes, nose and throat. Then we note running of the eyes and nose and the increased amount of saliva in the throat with swallowing. The employee soon feels sick at his stomach and vomits. If the worker is able to continue his work, he becomes sluggish and confused, mental dullness. He loses his finer sense of touch. If such exposure does not use him up, he complains for the next day or two of loss of appetite. It seems that his symptoms, if he gives up work, continue to grow worse for several hours and will require three to six days to clear up."

According to U. S. Public Health Service Report, Bulletin No. 185, the toxic effects of carbon tetrachloride vapor at various concentrations is as follows:

Concentration P.P.M. in Air	
48000 to 63000	Kills most animals in a very short time.
24000 to 32000	Dangerous in 30 to 60 minutes.
4000 to 6000	Maximum amount for 60 minutes without serious disturbances.
1600	Maximum amount for prolonged exposure.

I have cited these references to emphasize the fact that there is a definite hazard to be contended with in the use of carbon tetrachloride in the rubber industry.

Use of Carbon Tetrachloride

Carbon tetrachloride is used in the rubber industry as a solvent for rubber in the manufacture of cements, in certain dipping and spreading operations and as a cleaning solution.

Its solvent properties are made use of in the manufacture of rubber cements and many of the rubber cements put out to the trade are made with this solvent. Carbon tetrachloride has replaced carbon bisulphide, benzole, and coal tar naphthas to a great extent within recent years where it greatly reduces the poisonous properties of these more highly toxic solvents as well as making the cements non-inflammable and non-explosive. These cements are made by dissolving the rubber in the carbon tetrachloride and are put out to the trade in drums, tin cans and collapsible metal tubes. They are used for a multitude of purposes including library, office, and household uses. For the latter purposes they are usually put up in collapsible tubes or small cans or jars.

Carbon tetrachloride cements are also used in rubber factories for cementing rubber articles during the process of manufacture.

The usual method for making these cements is to put

the required amount of carbon tetrachloride into a churn, start the rotor and add the masticated rubber in small pieces until all of the rubber has been added. A rubber cement churn might be anything from a small open ice cream freezer to a 500 gallon enclosed and sealed tank with agitator. The most popular type of small churn used in many factories consists of a 50 to 75 gallon capacity vertical cylindrical iron tank with a cover and revolving paddle extending down within the tank. One-half of the cover opens to permit the charging with solvent and rubber while the other half of the cover supports the bearing for the shaft driving the agitator. These covers are not very tight and considerable solvent is lost through the lid and around the opening through which the shaft passes.

When cements are prepared for the trade in large quantities, either a 250 or 500 gallon tightly sealed type of churn is usually used. These types of churn are of heavy construction, bolted on top in which is a manhole for charging, which in turn is fitted with a tight gasket so as to keep the churn sealed during the actual churning process. The shaft for turning the agitator also passes through a stuffing box so the leakage from such a churn is very small indeed.

Loss of Solvent in Mixers

Some years ago the writer checked the loss of solvent during churning operations of these several types of churns. It was found that the old pony type of mixer with loose fitting cover had a loss of solvent of from 20 to 25 per cent. The usual 50 to 75 gallon type had a loss of from 10 to 15 per cent whereas the large sealed type showed a loss of only 2 to 3 per cent. So you can readily see that the type of churn used is a controlling factor in amount of ventilation necessary to remove carbon tetrachloride vapors from the cement churning room.

During the charging of the churn is where the greatest danger lies. But this operation is over in a few minutes so duration of exposure is short. There is, however, some precaution necessary to prevent the solvent splashing onto the hands or clothing. The solvent will not harm clothing, but will soak through rapidly and irritate the skin. Often the solvent is added at various stages of the churning. In the case of the small churns it is poured in with a bucket or through a hose. The large churns are fed by hose or automatic pipe system and pump. One of the best equipped cement departments which I have been in had full automatic system whereby all churns could be filled and emptied by compressed air through a system of pipes and valves. In this room the only contact with carbon tetrachloride vapors was while rubber was being charged in through the manhole. Needless to say there was very small chance of fumes escaping here. This room also had vents near the floor for the heavy vapors to escape through. Although there was no forced ventilation of this cement room, there was scarcely a trace of solvent odor at any time.

All hazard in the cement department can be removed by installing tight churns and having a good circulation of air, especially near the floor so that any escaping fumes which settle can be readily removed. A poorly ventilated room can be made safe by installing a suction system which withdraws the air from the lower part of the room and especially directly under the churns.

Large 500 gallon churns are sometimes set in a well below the floor level to make charging easier and to economize on head room. In such installations, no operative should attempt to descend into the pit for the purpose of making repairs or otherwise without first ventilating the pit with a fan, vacuum hose or other suitable means.

The filling of cans and collapsible tubes with the finished cement, unless done by machinery, should be done under a hood or over a table with down draft of air to draw any volatile fumes away from the operator. Even where machine filled, some ventilating device is advisable to prevent the fumes from spreading throughout the room.

In the manufacture of certain rubber articles, considerable cementing is done. Sometimes this is done mechanically and in other places it may be done by hand. As an illustration of satisfactory system of the former method, I will describe a system with which I have had some experience. The articles to be coated with cement were immersed in the rubber cement solution, withdrawn and placed in wire trays setting within a rectangular metal box with a suction applied at one end near the bottom. The surplus cement was drained into a removable pan at the bottom where it was returned to the cement churn and reworked. The articles were dried by a rapid down draft of air passing out through the opening at the bottom and then carried by the exhaust system without the building.

Suction Pipe to Exhaust Vapors

When cementing small articles by hand, the operatives can be seated at a table fitted with small grid plates directly in front of each worker. A suction pipe runs along under the table and connects all of these openings. The small cement tin should be placed in close proximity to the opening in the table top and the actual cementing carried out directly over the screened opening. I have in mind one installation where the cemented articles were placed on a traveling belt and carried to a drying chamber supplied with heat for drying and suction to exhaust the vapors.

There are numerous places throughout a rubber plant where various solvents including carbon tetrachloride are used for cleaning surfaces of rubber to make better adhesion during the manufacturing operations. Some of the worst hazards are involved here. There is both the hazard of getting the hands continuously wet with the solvent as well as the danger of inhaling the vapors arising from evaporation. It is quite common to use mixtures of carbon tetrachloride and naphthas for such purposes in the proportion of about ⅔ of carbon tetrachloride and ⅓ naphtha or gasoline. This is done to render the cheaper naphthas non-inflammable and to increase the cleansing effect of the latter.

Handling with Bare Hands Dangerous

In these washing operations a felt swab saturated in the solvent is frequently used and often handled with the bare hands. It is here where serious effects might develop and there are instances where very bad cases of poisoning have developed through such methods. Practically all such operations can be carried out by using a swab with a handle, thereby preventing the solution from coming into contact with the skin. Adequate ventilation should also be provided as noted above. If it is impossible to keep the solution from getting on the hands occasionally, it is well to have the workers rub a little glycerine or a mixture of glycerine water and a small amount of gelatine on their hands. The glycerine solution repels the solvent and prevents removal of fats.

Carbon tetrachloride is also used in a few special spreading operations where it is used as a vehicle for applying a thin coating of rubber over paper and delicate cellulose fabrications. The rubber is dissolved in the solvent as previously described and the solution fed onto a traveling sheet of the material to be coated. It is spread evenly by a system of rolls and scrapers and then passes through a drying chamber where the carbon tetrachloride is driven off thereby leaving a dry coat of rubber on the surface of the material.

Some Trends in RUBBER MANUFACTURE

METHODS of manufacture in the rubber industry change but gradually—but new trends and developments in processes are nevertheless continually taking place. In some cases it is the adoption of internal mixers or an improved bias cutter or more extensive use of conveying equipment. In others it is the use of more machine and less hand labor. At all times, however, new ideas—new methods—new machines are being developed or improved in practically all lines of rubber manufacture. The following trends indicate the reaction to current developments by one of our readers whose experience has been largely in the manufacture of rubber footwear.

Rubber Grinding

In recent years considerable has been learned about plasticizing rubber, and various plastometers have been devised for control. Long working on a cool mill is probably still the most effective method but, since research has indicated that the softening obtained is really due to oxidation, some cheaper way to produce it should soon be found than by heavy machinery and high power consumption.

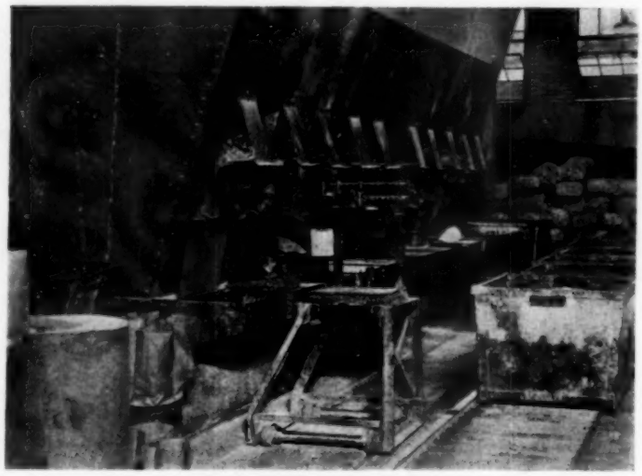
A recent contribution to plasticization is the addition of a special softener to the crude rubber in an internal mixer, thus reducing or eliminating the preliminary grinding. Apparently there is a trend toward less need for grinding mills.

Stock Cooling

Some desirable organic accelerators are fairly active at the temperatures of mixing, and, to offset the tendency of mixed stocks to set up, quick cooling is being more and more adopted. The most common medium for this is water, with or without soapstone or some other material to deposit a non-sticky layer on the surface.

Various expedients have been used, such as running water on the stock, or dropping it in a tank, or the more effective method of passing the stock on a conveyor through troughs of running water. The old time rubber man, who had to watch the moisture content of all his materials so closely, might be shocked to see how some stocks are sloshed around in water today.

Conveyor System in Tire Inspection Department



Hopper System in Compound Room

Water cooling is also extended to processed stocks, for example, having a calender deliver to a conveyor which carries the sheet through a trough.

Calendering

Basic machinery such as mills and calenders has not, in general, been changed much, but it is now possible to have a calender equipped with automatic gauges or weighing devices to show just what thickness of stock or weight of coating is being run.

Water Emulsions

Water emulsions of rubber, either as compounded latex or a dispersion, have come into use both for dipped goods and for cements in making other rubber goods, with elimination of expensive solvents and their fire hazard. Machines for applying cement may or may not need modification for latex, but in any event greater drying facilities are required such as conveyors, perhaps with added heat.

Conveyor Methods

The use of conveyor methods for mass production, long practiced in the automobile industry, has been gradually applied to the manufacture of rubber goods. A comparatively recent application of conveyor making is to rubber footwear, where, due to the unsymetrical shape, the many small pieces involved, and the numerous styles and sizes, the application of machinery is somewhat difficult. While much of the hand labor of building up a shoe is retained, special machines can be applied to some of the individual operations.

New Footwear Constructions

Another trend in footwear manufacture is to get away from some of the hand labor by entirely changing the method of construction. For example, the upper for a waterproof shoe is applied by dipping the last; coated

fabric parts, if desired, are placed on the outside; then the shoe turned inside out and the sole added. Another innovation is the molding of rubber parts to fabric, such as trim, counters, and even soles on tennis shoes.

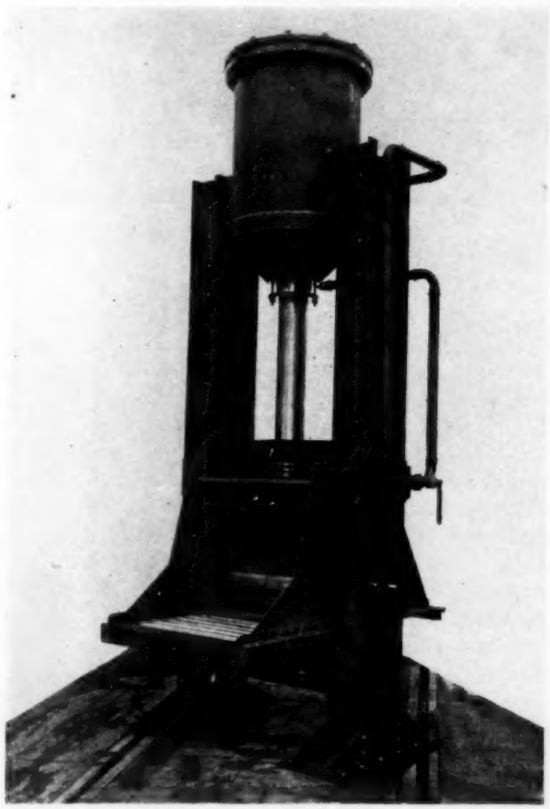
Ammonia Cure

Vulcanization in gaseous ammonia seems to have found considerable favor, and one large customer is said to have specified it on certain types of footwear regardless of whom it is purchased. This process does not necessarily require new equipment as the usual type of cylindrical vulcanizer suitable for curing in compressed air is equally suitable for ammonia. However, care should be taken to procure gauges, valves, etc., designed for the purpose as brass is rapidly corroded.

New Equipment

Raw Rubber Cutter

IN THE accompanying illustration is shown a new and simplified form of hydraulic raw rubber cutter which has been designed for working pressures of 50 lbs. to 100 lbs., by Theodore Bell & Co., Kriens-Lucerne, Switzerland. The machine is designed to exert a cutting pressure



of 30,000 to 40,000 lbs. The knife carriage is attached directly to the ram, the hydraulic cylinder being supported by a steel structure built up from channel sections riveted together. The feed and delivery tables are both furnished with rollers and, if desired, the whole machine can be mounted on wheels for easy transport. The cutter has a stroke of 25 in., a clearance of 31 in., and a speed of 1½ to 3 cuts per minute at full stroke. The control gear is so arranged that the knife can be held in any desired position and the stroke can be adjusted to the thickness of the rubber block, which it cuts into slices ⅜ in. thick. It is claimed that by using a low working pressure no special pump or accumulators are needed.

Wood Two Pressure Operating Valves

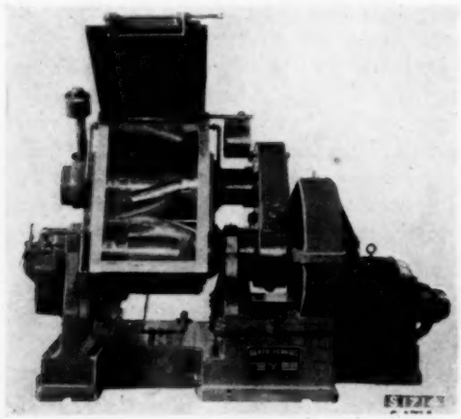
WHERE a two pressure system is employed in the operation of a hydraulic press, it is most essential that the low pressure completes the filling stroke of the press cylinder. A two pressure operating valve with auto-

matic high pressure admission recently put on the market by R. D. Wood & Co., Philadelphia, Pa., insures this result as the high pressure cannot be applied until the built-up low pressure in the press cylinder automatically opens the high pressure inlet. Thus the high pressure fluid is conserved for the working stroke only, which however, is not assured with a manually controlled high pressure supply. Only two operations are required for a complete cycle of press operation—one for the admission of low pressure to the press—the other for exhausting. The valve operates with either oil or water.

Baker Perkins "Rotacan" Mixer

THE most recent development of the Baker Perkins Co., New York City, in the mixing field is the change-can mixer shown here. This unit is the 150-gallon size, the largest now made. It was developed for especially tough jobs requiring very husky construction.

The mixing is done in a removable can, which is rotated by a geared-head motor mounted vertically in the column which supports the agitator. This agitator, in turn, is direct connected to another geared-head motor.



As shown in the picture, the agitator has been lifted from the mixing zone by the hand crank at the rear and the can is ready for removal.

Editorial Comment

As the old year begins to make its bow, THE RUBBER AGE desires to wish its friends throughout the world, a Merry Christmas and a Happy New Year. We value the interest and support accorded us during the past year and by diligent effort we hope to merit a continuance of that confidence during the coming year.

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A New Era

DESPITE the many misgivings with which the working of NRA is looked upon by some of its critics, it cannot be denied that much of permanent good is bound to result from application of its principles to business. For years business has gone on haphazardly at least as far as any united effort to control it was concerned. Production in individual factories was increased without regard to the industry or business as a whole. Rugged individualism was the order of the day. Through necessity this condition is now being changed and business men—some willingly and others unwillingly—are cooperating with other members of their industry and with business leaders in general. They have widened their angle of vision and are gradually laying a basis for the future expansion of business on an orderly basis so as to be in a better position to weather the storms of depression.

The rubber industry has not as yet progressed far towards this new vision. It is taking long to throw off the shackles of the past—witness the delay in completing the Tire Code—but when it does, we feel certain that the good accomplished by the necessity of getting together to solve common problems will last a long time. However, there are still several big problems to be licked in the industry—especially in changing many of the merchandising practices of tires—but when these matters have been settled, the industry will be in a united position to combat outside disturbing conditions instead of having to waste money and effort in fighting inside troubles.

Financially rubber manufacturers are on a sounder basis today than they have been for many years. Many have a year's or more supply of raw materials purchased at low levels and commodity quotations are continuing their upward trend which means that finished products will command higher and higher prices. From a profit making viewpoint, therefore, the immediate future is bright.

It is to be hoped that the progress which has been made in the rubber industry will not be nullified by any untoward action by an individual manufacturer or group of manufacturers. The road to stability and progress and profit is ahead of us—let us not stray from it to chase will-o'-the-wisps of the past.

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Children of Depression

IT IS hard to believe that a period of depression has any bright side. It is true, however, for frequently when times are bad technologists are put on research and development problems which ordinarily are slighted for lack of time when plant and laboratory are busy on routine production. As proof of what research accomplished during the depression, there were shown at the recent Chemical Industries Exposition over a hundred so-called "Children of Depression"—products or processes which would probably not have seen the light of day for many years had it not been for the opportunity offered by the depression. Some of the astounding items shown were a 160,000 mesh wire cloth, platinum plated nickel, safety glass which will not shatter at low temperatures, adhesive surgical tape which can be cleaned by washing, and others too numerous to mention.

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Challenging High Prices

IT IS interesting to note that current complaints against high prices are most frequently made by retailers against jobbers and manufacturers, according to an analysis of recent letters received by the Consumers Advisory Board of the National Recovery Administration. Numerically this type of complaint was half again as many as those registered by ultimate consumers against the retailers themselves.

Manufacturers, the survey shows, entered the fewest number of complaints against price rise, which, in their case, would be directed at those who supply them with raw materials. But manufacturers, mills and their agents, were the most complained of in the letters. Jobbers' prices were challenged fewer times than those of manufacturers, and complaints lodged by ultimate consumers against retailers were fewest of all. This last fact, however, should be considered in connection with the small number of "over-the-counter" buyers who entered protests against prices. It is not surprising that the buying public response was the smallest for the individuals' complaints were naturally made to the retailer at the time of purchase, the retailer in turn passing the complaint on to the jobber or manufacturer through Consumers Advisory Board.

CURRENT • NEWS
of the Rubber Industry

DECEMBER, 1933

AGREEMENT ON TIRE CODE EXPECTED SOON

Protests on Price and Distribution Control Provisions Prevent Completion —Manufacturers Fail to Give Assent on Dead Line—Rubber Industry Code Completed

The rubber tire industry code has at this writing (December 11) yet to meet the approval of all manufacturers despite the desperate efforts of several assistant NRA administrators. Every possible means has been taken to whip the industry into line but the refusal of the smaller manufacturers to agree to the code until it contained suitable marketing provisions, or means for "controlling the Standard Oil Company" and for the sale of special brand tires, has held up the code's completion. The other manufacturers, said to be Goodyear, Goodrich, United States, Fisk and Pharis, approve of the present draft but they had opposed the code until several weeks ago when certain regulatory measures were deleted.

The larger group of 22 manufacturers who oppose the code at present state that it is "toothless" and ineffective in overcoming the industry's evils. The situation was at a standstill until the end of November when NRA officials summoned leading factory executives to Washington and it is reported they were given until December 5 to settle their differences and give final assent to the code. On that date it was said that "approvals were coming in slowly" and that the deadline would have to be extended a day or two. The latest information is that further conferences with manufacturers will be scheduled, it was announced on December 8 by the National Recovery Administration. Reports from the industry said the statement, indicated that several features of the code require additional study and as a result the Administration will continue its discussions with the tire manufacturers.

In the meantime the code for the balance of the rubber industry is completed and in the hands of President Roosevelt awaiting signature.

New York Group XMAS PARTY

As we go to press final plans are being completed for the annual Xmas Party of the New York Rubber Group to be held on Friday, December 15, at the club rooms of the Building Trades Employers Ass'n. at 2 Park Ave., New York City. In addition to two technical papers, there will be entertainment and drawing of a number of prizes donated by various rubber companies and suppliers. The papers are, "Factice in Rubber Compounding" by Kingsley Gillespie of Stamford Rubber Supply Co., and "Recent Developments in the Soviet Chemical Industry" by Theodore M. Switz. The Nominating Committee will also bring in its slate of new officers and executive committee for the coming year.

TIRE FABRIC MILLS EXEMPTION ENDED

Following an active campaign by tire makers operating their own fabric mills, led by the Goodyear Tire & Rubber Company, President Roosevelt announced on December 6, after a public hearing, that the exemption previously granted manufacturers of tire yarns and fabrics from the machinery limitation provisions of the Cotton Textile Industry Code, would be ended on December 11.

The first stay under which tire fabric manufacturers had been temporarily exempt from the machine hour limitation of the Cotton Textile Code was granted by President Roosevelt on July 15 and later extended to July 30. This was extended to November 13 and then to November 20. Meanwhile, however, the affected manufacturers applied for another hearing and on November 27, the President issued another executive order extending the termination date of the stay until completion of the hearings and final action on the new application for exemption. The decision annouced on December 6 results from the last hearing.

The order resulted in a change in fabric mills operated by tire manufacturers from three-40 hour shifts to two-40 hour shifts. President Litchfield of Goodyear in a statement made prior to the hearing, said that if the shorter schedule was put into effect 1200 workers in the Goodyear cotton mills would be laid off.

CHICAGO GROUP HOLDS INTERESTING MEETING

The Chicago Rubber Group, A.C.S. held its Fall meeting on Friday evening, November 17, at the Hotel Sherman with a large attendance on hand to hear a well balanced program of papers and entertainment.

S. Collier, Chief Chemist of the Waukegan factories of the Johns-Manville Corporation, presented a paper on "Asbestos and Its Use in the Manufacture of Rubber Goods." The paper was illustrated by slides indicating the physical characteristics of the various grades of asbestos, and by moving pictures which showed the manufacture of many products with asbestos and the equipment necessary for testing the finished products.

The next feature was a talk by W. P. Bauer, Managing Director of the Lawyers Legislative League on "The Benefit of a Code to the Rubber Industry." Mr. Bauer discussed the various phases of the NRA and its effect on rubber manufacturers. Mr. Bauer's talk brought out considerable discussion on the code.

As a surprise feature of the evening, Dr. Walter H. Grote of the United Carbon Co., presented several tricks which mystified the audience. Dr. Grote then proceeded to explain (?) how these sleight of hand tricks were really done.

As a guest of the evening, Benjamin Felix, President of Featheredge Rubber Company, gave his interpretation of the benefit of a code to the rubber industry and was received with enthusiastic acclaim.

Dr. C. E. Frick, Chairman of the Entertainment Committee of the Rubber Division Banquet held in September, presented his report indicating that a substantial profit was made and that the paid attendance was 264.

The chairman of the Chicago Group is J. Kirschner, chief chemist Dryden Rubber Company, and the secretary is B. W. Lewis, Wishnick-Tumpeer Co., 365 E. Illinois St., Chicago.

U. S. Tires Sales Convention

Forty district managers of U. S. Tire Company recently held a four-day sales convention in Detroit. J. F. O'Shaughnessy, general manager, and L. M. Simpson, sales manager, conducted the sessions which were held to discuss 1934 sales plans.

CHEMICAL EXPOSITION PROVES SUCCESSFUL

The Fourteenth Exposition of Chemical Industries, which had been in session during the week of December 4 to 9 at Grand Central Palace, New York City, was by far the most successful exhibition ever held by this important industry. From its "Children of Depression" display, which included more than a hundred new ideas selected from some 700 inventions developed in the past two years, to individual exhibits of sizeable machinery, the exposition recorded progress. Visitors from all parts of the United States and more than a score of Foreign countries were in attendance. The registrations included engineers and technologists from England, France, Germany, Italy, Norway, Sweden, Belgium, Switzerland, Spain, U.S.S.R., Japan, Africa, Australia and other distant places. A number of rubber technologists viewed those exhibits of interest to the testing and production of rubber goods.

The exposition revealed much that has been developed since the last show held in 1931. Products and processes of yesterday have been revolutionized within a comparatively short time and many new inventions introduced, most of which were interestingly demonstrated. Such important processes as air conditioning, flow of liquids, crushing and grinding, mechanical separation, filtration, evaporation, drying, distillation and others, proved of great interest.

Among the exhibits which were of particular interest to the rubber industry were the following:

Abbe Engineering Co., New York City—Agitators, Autoclaves, Grinding Mills, Evaporators, Laboratory Supplies, Mills, Mixers.

Alsop Engineering Corp., New York City—Agitators, Laboratory Supplies, Mixing Equipment.

Baker Perkins Co., New York City—Drying and Mixing Equipment, Heating Systems, Industrial Ovens.

Christian Becker, Inc., New York City—Balances.

Binney & Smith Co., New York City—Boiler Covering, Insulation Brick, Cement, Electric Furnaces.

Bristol Co., Waterbury, Conn.—Controllers, Electrical Supplies, Gauges, Thermometers.

Brown Instrument Co., Philadelphia, Pa.—Controllers, Gauges, Thermometers.

Buffalo Foundry & Machine Co., Buffalo, N. Y.—Agitators, Autoclaves, Drying Equipment, Evaporators, Vulcanizers.

Dow Chemical Co., Midland, Mich.—Solvents.

Foxboro Co., Foxboro, Mass.—Controllers, Gauges, Indicators, Thermometers.

Freas-Thermo Electric Co., Irvington, N. J.—Air Conditioning, Drying Equipment, Humidifiers, Laboratory Supplies, Electric Ovens.

General Electric Co., Schenectady, N. Y.—Air Conditioning, Gauges.

Glyco Products Co., Brooklyn, N. Y.—Solvents and Polishes.

Hauser-Stander Tank Co., Cincinnati, Ohio—Rubber Line Tank Cars and Tanks.

Johns-Manville Corp., New York City—Mineral Fillers.

Lancaster Iron Works, Inc., Lancaster, Pa.—Mixers.

Ohio Chemical & Mfg. Co., Cleveland, Ohio—Laboratory Supplies, Rubber Lined Tanks.

Pfaltz & Bauer, New York City—pH Indicators, Laboratory Supplies.

Premier Mill Corp., Geneva, N. Y.—Colloid Mills.

Proctor & Schwartz, Inc., Philadelphia, Pa.—Drying Equipment.

Quaker Oats Co., Chicago, Ill.—Furfural.

Raymond Bros. Impact Pulverizer Co., New York City—Grinding Mills, Perverizers, Separators.

Thermatomic Carbon Corp., New York City—Soft Blacks.

Torsion Balance Co., New York City—Balances.

Turbo Mixer Corp., New York City—Aerotors, Agitators, Evaporators, Laboratory Supplies, Mills, Mixers

Carbon Black Code Ready

At this writing (December 5) the code of fair practice for the Carbon Black Industry, is about ready for submission to President Roosevelt for approval following a number of changes made as a result of the public hearing held last month. At that hearing an amendment was presented by the code sponsors providing for a 42-hour week average in any six weeks' period, instead of 1,088 hours over a 26-week period. Regarding the limitation of production to actual sales, as provided in the code it was pointed out that this was due to the fact that practically every manufacturer in the industry has a year's supply on hand. It is believed that this provision is retained in the revised draft of the code. The completed code is being submitted to the industry for its approval before being submitted to the President.

CARBON BLACK PRICES WILL RISE JANUARY 1

New schedules of prices for carbon black will go into effect on January 1, increasing present quotations about 1¼ cents a pound. At the same time a new method of quotations on a delivered basis varying according to zones will supersede the f.o.b. works quotations now in vogue.

On carload shipments, delivered, the new price on the Atlantic Coast, as far south as South Carolina, is 5.35 cents a pound; in the midwest, in virtually the Central Freight Association territory, 5.05 cents, and on the Pacific Coast, 4.90 cents for 50,000-pound lots and 5.05 cents for 30,000-pound lots. The former price was 2.72 cents a pound f.o.b. Texas works, which was the lowest price in the history of the industry. The new schedule establishes prices about equivalent to those in effect early in 1931.

Export prices on carbon black, quoted c.i.f. European destinations, have also been marked up slightly.

Ansbacher-Siegle Conference

Salesmen and sales agents of the color division of Ansbacher-Siegle Corporation met on November 24 and 25 at the company's plant at Rosebank, Staten Island, N. Y., to discuss 1934 sales plans, according to an announcement by F. H. Couchman, sales manager of that division. In addition to company officials, the following technologists, salesmen and sales agents were present: Wm. Erath, Fred Nafis, M. Parker, F. B. Walker, Ansbacher-Siegle, Rosebank; A. H. Schoen, Ansbacher-Siegle, Philadelphia; E. F. Smith, H. M. Cotey, John Nerl, American Aniline, Chicago; Leonard Storey, Dominion Anilines, Toronto; R. McC. Bullington, Bullington Paint Co., Richmond; H. L. Grund, Henry L. Grund Co., Cleveland; R. H. Coerdt, Ansbacher-Siegle, Cleveland; C. F. Heilman, Paint Mfgrs. Supply Co., Detroit; Wm. G. McIntyre, Wm. G. McIntyre Co., Boston.

RUBBER RESTRICTION STILL BEING DEBATED

The high hopes held by rubber interests throughout the world that some definite action on restriction would result from the conference in Batavia on November 24, failed to materialize. Though meetings were held by Directors of the Department of Agriculture, Industry and Trade of the Netherlands Indies and the District Commissioners, no statement for publication was issued. Reports however indicated that the majority of those at the meeting favored government intervention in the planting industry, some favoring an ad valorem export duty and other favoring a pro rata quota system of restriction. Later advices leaned towards the quota system, which if adopted would postpone any general restriction scheme at least six months as it was estimated that that length of time would be required for preparation. This is doubted, however, by Symington & Wilson, London, who in their December 2 review of the rubber situation state, "that as native rubber has for years paid an export duty in the Dutch East Indies, full statistical information and a good deal of the machinery for working export quotas must be already at hand."

The latest development was a report on December 7 that the Dutch East Indies are unwilling to give up their interests to an international rubber council and want economic guarantees and a fair chance for native rubber. It is generally conceded however that despite temporary setbacks, restriction in some form will be in force within the next five or six months.

O'NEIL PREDICTS TIRE PRICES WILL ADVANCE

William O'Neil, president of General Tire & Rubber Company, in an address before the St. Louis Chamber of Commerce on November 24, predicted that tires are bound to increase in price and that they will reach 1926 levels within the next ten months.

"Costs in tire factories," stated Mr. O'Neil, "have gone up 27½ per cent in the past two months. There has been a steady downward trend in the prices of tires since 1926, but there is now a definite turn in the other direction. Tires have gone lower than wheat, cotton or any farm community ever did. Recent increases in the value of goods now on shelves of retail merchants over what they were a few months ago are equivalent to a rise in the price of cotton to 15c a pound or of wheat and corn to $1.00 a bushel. Prices of stocks have gone up from their lows just as much as the value of dealers' stocks of merchandise have risen and more people are affected by stock prices than are by farm prices."

Milton H. Martindell, vice-president and secretary-treasurer of the Joseph Stokes Rubber Co., has recovered from an illness which kept him indoors for some time.

RUBBER PROMINENT IN FORD N. Y. EXPOSITION

The Ford Exposition of Progress which opened at the Port Authority Commerce Building, N. Y. City, on December 9 contains a number of interesting exhibits of rubber products in addition to early automobile models, automobile body manufacture, and other exhibits depicting the history and manufacture of automobiles.

The U. S. Rubber Company is represented with a miniature Sumatra rubber plantation with living rubber trees from which latex is gathered. The exhibit includes the complete operation of tire manufacturing.

Goodrich is showing a complete line of tires including the world's largest airplane tires, nearly five feet high and more than a foot across. General Tire & Rubber Company is represented by tires on the Briggs Manufacturing Company "dream car"—the car which caused so much comment in Detroit recently. The car has its engine in the rear and is streamlined to the last degree, even to the tires. By reducing wind resistance by 45 per cent, the car can attain a speed of 110 miles an hour with a 75 H.P. engine, which could drive one of today's cars, of the same weight and size, only 80 miles an hour. Firestone Tire & Rubber Co., exhibited a replica of a gum dipping machine in operation and a chromium plated Ford chassis showing all the rubber parts of an automobile.

"Dream Car" with General Tires at Ford Exposition

NEW RUBBER FOOTWEAR COMPANY ORGANIZED

Culminating several months of activity in the development of a new type of footwear consisting of both canvas and leather uppers with rubber and leather soles, a new company was organized in Rhode Island on November 15 under the name of Bristol Manufacturing Company, Bristol, R. I. In addition to making footwear, the company will manufacture a line of shoe findings for leather shoe manufacturers.

The company is capitalized at $100,000. consisting of 1000 shares of preferred stock at $100 a share, and 3000 shares of no par common or capital stock.

The directors of the corporation are Herbert L. Tinkham, James F. Buckley, Brig. Gen. Luke H. Callan, Eugene C. Heilhecker, and Maurice C. Smith, Jr.

Officers are: President, Herbert L. Tinkham; vice-president, Eugene C. Heilhecker; treasurer, Maurice C. Smith, Jr.; secretary, Frederick F. Wilson; assistant treasurer, Frederick F. Wilson; assistant secretary, Bessie B. Tobin; general manager, Maurice C. Smith, Jr.; counsel, Judge Edward L. Leahy.

President Herbert L. Tinkham was formerly president of the W. L. Douglas Shoe Company of Brockton, Mass. James F. Buckley of Brockton, Mass., was formerly in the shoe business. Brig. Gen. Luke H. Callan, a road contractor, is president of the Callan Construction Company, Inc., and is State Senator from Bristol. Vice-President Eugene C. Heilhecker was formerly connected with United States Rubber Company in charge of their Pattern Department. Treasurer Maurice C. Smith, Jr., was formerly general manager of the Bristol plant of U. S. Rubber Company and Secretary Frederick F. Wilson was formerly paymaster and accountant of the same company, while Assistant Secretary Bessie B. Tobin was previously assistant to the general manager of the same plant.

Sanitary Specialties Code

A revised code for the Sanitary and Waterproofing Specialties Manufacturing Industry was submitted for approval at the public hearing held on November 20. The industry covers the manufacture of waterproof crib sheets, baby pants, dress shields, household aprons, sanitary lingerie, rubber or stockinette materials, etc.

The code provides for a 40-hour week with a minimum wage of 35 cents an hour except for apprentices who shall be paid not less than 28 cents. No home work is permitted by employers 90 days after the code becomes effective.

UNITED CARBON HOST TO RUBBER TECHNOLOGISTS

Over 200 guests, including many well-known rubber technologists, attended the convention and annual "get-together" held by the United Carbon Company at its plant in Charleston, West Va., on November 10 and 11. Those who attended as the guests of Oscar Nelson, president of the United Carbon Company, were entertained at a preliminary banquet on Friday evening, followed by an inspection of the company's plant and laboratories on Saturday morning, attendance at the Huntington-Charleston football game in the afternoon and a banquet at the Daniel Boone hotel on Saturday evening.

In addition to many of the prominent local civic and industrial leaders of Charleston and vicinity, and executives of the United Carbon Company, a large number of representatives of rubber companies were on hand. Arthur B. Koontz, Charleston attorney and one of the organizers of the company, acted as toastmaster. Mayor DeVan extended an official welcome to the visitors and Lon H. Kelly, president of the State Bar Association, humorously picked "flaws" in an article "Oscar Nelson, Genius of the Carbon Black Industry" which had been published in a recent issue of the *West Virginia Review*. Mr. William G. Conley then reviewed briefly the development of the carbon black industry and the history of the United Carbon Company. Mr. Nelson made no address but welcomed all the guests to Charleston.

Rubber company representatives on hand were as follows: *Goodyear*—R. P. Dinsmore, George Hinshaw, H. J. Miller, L. B. Sebrell, Winfield Scott, Henry Powers, E. A. Van Valkenburgh, Herman Thies, Howard Prothero; *Firestone*—E. W. Oldham; *U. S. Rubber*—William Valentine; *Goodrich*—R. P. Allen, E. G. Siess, B. Taylor, S. Catt; *Seiberling*—W. S. Wolfe, C. A. Carlton; Harry Shrank, R. E. Vanatta, Ralph Laporte, E. Gibbs (Canada); *Mohawk*—John Christie; *Dayton*—J. Rockoff, *Pharis*—Ralph Reel, J. A. Coelho; *Master*—J. A. Roberts; *General*—R. M. Graham; *Monarch*—R. J. Himmelright; *Denman*—H. F. Webster; *Fisk*—Stanley J. Krall, Walter Geldard. Other rubber men who attended were V. L. Smithers; Gordon Collins (Clapp); Robert Gunther and N. Lajohn (Inland); A. Banta (McClaren); T. C. Crisp (R.C.A.).

Among the company's agents and branch managers were F. F. Myers, Akron, W. W. Higgins, Curt Swanberg and H. B. McCreary, N. Y. City; L. G. Whittemore, Boston; and C. M. Baldwin, Chicago.

Clay Quotations Rise

Domestic clay now quoted at $6.50 ton will advance to $7.50 ton f.o.b. works on January 1, 1934, according to announcements made by members of the recently organized China Clay Producers' Association.

NEW ENGLAND NEWS

Distinct improvement in manufacturing volume among the rubber factories of Connecticut is indicated by recent statements of executives. In practically every case, sales are reported on the uptrend with prospects for the winter and spring brighter than in several years past.

"Business is better than it has been in the past several years," F. Thatcher Lane, vice-president and general manager of the Seamless Rubber Co., New Haven, drug sundries and sporting goods, is quoted as saying. "We are operating with an increased staff. The low condition of inventories and unfilled orders on hand and in sight will make possible the continuation of our present rate of production until April 1. . . . We are employing about 1,000 people just now, and since July 1, our business has been far ahead of last year."

James A. Walsh, president of the Armstrong Rubber Co., West Haven, tire manufacturers, reported as follows: "Even during the dull winter season we haven't laid off a single man. Although we are using the stagger system, every man in our employment will be carried throughout the winter. We are very optimistic for the future. Next year will be a good year."

Improvement during November is reported by F. B. Kingsbury, secretary and general manager of the Whitney Blake Co., New Haven, manufacturers of insulated wire. The company is now employing more hands than at any time in the past two years.

The United States Rubber Co. is adjusting production schedules at its footwear plants in Naugatuck, Conn., in such fashion that it will be unnecessary to lay off numbers of employes, according to Walter H. Norton, factory manager. Mr. Norton advised employes that "it is reasonable to believe that employment can be furnished to the greater part of the 6,000 employes on a fairly satisfactory schedule during the next few months."

The annual shift from heavy rubber to tennis goods production started in November, and Mr. Norton said that by January 15 production in the tennis department would be doubled while that of gaiters and other goods would be cut nearly in half.

The Schavoir Rubber Co., which operates two plants in Stamford, Conn., for the manufacture of rubber toys and hollow rubber goods, is preparing to consolidate its operations under one roof in the former British-American Mfg. Co. plant in Springdale, a suburb. In the new location, which will be occupied in February, production will be expanded, according to Mrs. Arnold L. Schavoir.

The Norwalk Tire & Rubber Co., Norwalk, Conn., which manufactures automobile and truck tires, batteries and a variety of rubber accessories, showed a net profit for the fiscal year ending September 30 of $73,555.86. Net surplus as of that date was $391,711.24. The annual report to stockholders pointed out that this showing was highly satisfactory, considering that it was achieved in spite of the worst price war in the industry's history, that precipitated a price reduction level of 25 per cent.

Harry C. Miller was named a director of Norwalk to succeed Dr. William F. Russell at the annual meeting, all other officers and directors being re-elected. John W. Whitehead is president of the corporation.

About 300 employes of the Fairfield, Conn., plant of E. I. duPont de Nemours & Co. will be benefitted by the recently-announced plan of giving all regular workers an annual vacation of one week with pay. The plan will apply to all du Pont-controlled factories, including the Remington Arms Co., Bridgeport, which employs 2,000.

Firemen were called to the Fairfield duPont plant three times during November by two small fires and a false alarm. Damage was slight in both cases when fire actually broke out.

The Canfield Rubber Co., Railroad avenue, Bridgeport, Conn., has discontinued operation of its private printing department, that section of the plant being taken over by Stephen J. Koperdak, who is conducting a commercial printing business under the firm name of Utopian Press. Mr. Koperdak had been connected with the Canfield printing department for a number of years.

LASTEX MEN'S SUITS OFFERED IN STORES

Under the designation of "Living Clothes," several New York clothiers last month announced men's suits made of Lastex. This is the first public announcement made of this use of Lastex though it had been reported for some months that textiles suitable for men's clothing were being made. Percy Adamson, of Adamson Brothers, designers of the equipment for covering Lastex thread, has had a suit of the new material since last Spring and it has not required any pressing. Mr. Adamson stated to a newspaper reporter, "I had an entire wardrobe made up of the new-process fabrics. I made a trip to Europe. Whenever I unpacked I simply took out my suits, shook them and they were ready to wear. Not a single wrinkle and the creases stood up in all their pristine splendor."

The "living clothes" advertised by Franklin Simon & Co., and Abraham & Straus, were said to yield with every movement, to spring back to their original shape, to give resilience instead of resistance, to fit better, wear better and keep a press longer.

RUBBER CONSUMPTION LOWER IN OCTOBER

Consumption of crude rubber by manufacturers in the United States for the month of October amounted to 31,906 long tons, which compares with 35,686 long tons for September this year, and represents a decrease of 10.6% under September but was 43.2% over October a year ago, according to statistics released by the Rubber Manufacturers Association. Consumption for October 1932, was reported to be 22,286 long tons. Consumption for first ten months 1933 amounted to 347,439 long tons as compared with 290,754 long tons for same period 1932.

Imports of crude rubber for October were 43,016 long tons, a decrease of 9.2% under September but was 21.3% above October 1932.

The Association estimated total domestic stocks of crude rubber on hand October 31, at 343,579 long tons, which compares with September 30, stocks of 334,637 long tons. October stocks show an increase of 2.7% as compared with September of this year, but were 4.1% below stocks of October 31, 1932.

The participants in the statistical compilation report 58,568 long tons of crude rubber afloat for the United States ports on October 31 compared with 57,255 (revised) long tons afloat on September 30, this year, and 40,176 long tons afloat on October 31, 1932.

October reclaimed rubber consumption is estimated to be 7,212 long tons, production 9,466 long tons, stocks on hand October 31, 17,748 long tons.

Gill Appointed by Goodrich

W. W. Gill has been appointed manager of the national accounts sales division of the truck and bus tire department of The B. F. Goodrich Company, it is announced by C. B. O'Connor, general sales manager of the Goodrich tire division. Mr. Gill succeeds C. H. Russell, who died suddenly in Chicago after a heart attack on October 25.

Mr. Gill comes to his new post after four years as national accounts sales representative for Goodrich in New York City. He is succeeded in that post by J. R. Rutherford, formerly sales supervisor in the Milwaukee district.

Born in New Brunswick, N. J., Gill attended the College of the City of New York for two years, and has been in the tire industry for 15 years.

Drogin Talks on Carbon Black

Dr. I. Drogin, of J. M. Huber, Inc., spoke on the subject of Carbon Black before the Colorado section of the American Chemical Society which convened in Denver, Colorado, on November 24th for a dinner meeting at the Olin Hotel. Dr. Drogin described the development and growth of the manufacture of Carbon Black, its characteristic properties and its various applications in the industries. The talk was illustrated with specially prepared slides, which graphically portrayed the various stages in the operation of Carbon Black manufacture.

PERSONALS

Appointed Federal Reserve Director

Announcement has been made of the appointment of A. P. Funk, president of La Crosse Rubber Mills Co., footwear manufacturers of La Crosse, Wis., as a

A. P. FUNK

director of the Federal Reserve Bank of the Ninth District at Minneapolis, Minnesota.

The Ninth Federal Reserve bank district includes the states of Montana, North and South Dakota, Minnesota, the north two-thirds of Wisconsin and the northern peninsula of Michigan. The board of directors consists of nine members, divided into three classes, each of which has a membership of three. Class B, to which Mr. Funk has been elected, represents the industrial, agricultural and commercial interests. Classes A and C represent the banks that are members of the Federal Reserve bank. Directors in Class A and B are elected by the bank members while those in Class C are appointed by the Federal Reserve board at Washington.

Under the election rules, candidates for director in Classes A and B are nominated by the banks in their respective groups.

Mr. Funk was elected to succeed John S. Owen of Eau Claire, whose term expires December 31, 1933. Mr. Funk was born in La Crosse where he has resided continuously. In 1890 he became associated with the La Crosse Rubber Mills Company of which he is now president and treasurer. He is also a director of the Employers Mutual Liability Insurance Company of Wausau, Wis.; president of the Eau Claire Cold Storage corporation and vice-president of the G. Heileman Brewing Company. In addition he also has banking interests in Milwaukee and Chicago.

C. R. JOHNSON of Needham, Mass., for the past four years Eastern sales representative of the Philadelphia Rubber Works Company, Akron, Ohio, has resigned. Mr. Johnson has announced no plans for the immediate future.

A. L. VILES, general manager of the Rubber Manufacturers' Association, was recently appointed in charge of canvassing the rubber industry for contributions to the fund being raised to assist New York City's family welfare societies.

HOMES STOODY, formerly of Central United National Bank, Cleveland, recently joined the export department of Goodyear Tire & Rubber Company.

HERMAN KOELLIKER, factory manager of Ohio Rubber Company, was recently made vice-president of the company. Other changes in the plant personnel, as announced by the president, Franklin G. Smith, are: W. MILLER COOK, promoted to the position of sales manager of the mechanical goods division; CHARLES M. PROBASCO, promoted to the position of assistant to the president.

CLARA BINGHAM, assistant librarian of Goodyear Tire & Rubber Company, recently started on her 36th year with the company. Miss Bingham was the company's first stenographer under F. A. Seiberling. In 1917 she was put in charge of social service work and two years ago was transferred to the library.

C. W. SEIBERLING, vice-president and treasurer of Seiberling Rubber Company, was recently appointed a member of the County Hospital Board in Akron.

JOHN A. LAMBERT, vice-president and treasurer of the Acme Rubber Manufacturing Co., has recovered from a lengthy illness.

C. DUDLEY WILSON, of Princeton, secretary-treasurer of the Luzerne Rubber Co., Trenton, who underwent an operation in a hospital, has recovered.

TRENTON NEWS

Robert J. Stokes, president of the Thermoid Company, Trenton, has issued the following statement to the holders of six per cent notes due in 1934:

"The operating statement of Thermoid Company and wholly owned subsidiaries for the first six months of this year showed a net profit of $409.92 and for the first nine months a net profit of $92,537.52 after all charges including depreciation, note interest and taxes. This compared with a net loss of $80,970.14 for the first six months of 1932, and with a net loss of $127,017.56 for the first nine months of 1932 respectively.

"Before interest, depreciation and taxes the operating profit for the three months' period ending September 30, 1933, amounts to $177,870.43.

"The above figures do not include Southern Asbestos Company, a 96% owned subsidiary, which showed a profit from operations after all charges but before depreciation and taxes for the first nine months of this year of $36,476.15. For the three months' period ending September 30th, the operating profit for this subsidiary before depreciation and taxes was $17,826.79."

The strike of the employes of the Essex Rubber Company, Trenton, was settled November 28 after being in effect for two weeks. The settlement was on a basis of a study made by Professor D. A. McCabe, of Princeton University and counsel for the NRA. It was signed by Harold S. Maddock, receiver for the Essex plant, and Walter P. Farrell, president of the Rubber Workers' Union. The agreement permits organization of a union and collective bargaining, but also specifies that no workers shall be barred from employment who is not a member of the union. The employers agree to adhere to the terms of the NRA. The employers also agree not to discriminate against members of the union. Length of service or seniority is to govern the action of employers when it is necessary to lay off hands. The company is not required to retain in its employ any person "who shall be convicted of a criminal charge now pending involving a misdemeanor or more serious offense arising out of this strike."

Corliss White, of Trenton, N. J., for 35 years superintendent of the old United & Globe Rubber Company, Trenton, died recently. Death was due to a heart condition from which he suffered a long time. He is survived by his widow and two daughters. Burial was in Trenton.

The Joseph Stokes Rubber Company and the Murray Rubber Company had large exhibits of their products at the recent National Recovery Show at the Trenton Armory.

Miah Marcus, president of the Puritan Rubber Company, Trenton, has been made chairman of the heel and sole and rubber flooring division of the Rubber Manufacturers of New Jersey.

Salesmen representing the eastern territory of the Thermoid Company recently held their annual conference in Trenton and discussed conditions and new price lists. The company is operating normally at this time.

Robert Lee, vice-president of the Thermoid Company, spent three weeks at the company's exhibit at the Century of Progress in Chicago and also attended the annual meeting of the automotive associations in Chicago.

William A. Howell, superintendent of the Whitehead Brothers Rubber Company, Trenton, was chairman of the mayor's citizens' committee in charge of the annual ball for the benefit of the "Poor Kiddies Fund" of Trenton.

Financial News

Raybestos-Manhattan Profit

Raybestos-Manhattan, Inc., earned a profit of $465,380.44, equivalent to 72c per share on net sales of $3,683,700.39, during the quarter ended September 30, 1933, comparing with a loss of $68,210.58, upon sales of $1,828,024.71, during the same quarter in the year prior.

During the nine months ended September 30, 1933, the company earned a net profit of $694,777.03 or $1.08 per share, on sales of $8,196,271.14. In the same period in 1932 the company incurred a net loss of $185,810.68 on sales of $6,344,704.00. The company has no banking or funded debt, or capital obligation senior to the common stock. Net current assets at September 30, 1933, were $6,710,380.03 of which $2,907,388.46 represented cash and marketable securities. These net current assets amounted to $10.44 per share on the 642,900 shares of its common stock issued and outstanding.

The directors declared a dividend of fifteen cents per share, payable December 15, 1933, to stockholders of record at the close of business November 29, 1933.

General Resumes Dividends

Resumption of payments of preferred dividends by The General Tire and Rubber Company was announced on December 6 by W. O'Neil, President of the company, following a meeting of company directors.

Payment of the regular quarterly dividend of $1.50 a share on the company's preferred stock will be made on December 30 to stockholders of record as of December 20.

"Our company appears to have earned the regular preferred dividend during the fiscal year which closed on November 30, although the annual audit of our books has not yet been completed," Mr. O'Neil said. "our annual statement is expected to show that the company has an adequate cash reserve and has no indebtedness of any kind, either in the form of bonds, notes or bank obligations. In 17 out of the past 18 months, our collections of cash have exceeded our sales. This is an indication that our dealers are in a much improved condition."

Dunlop Conversion Successful

The recent offer of the Dunlop Rubber Co., Fort Dunlop, for conversion of its 5½ per cent debenture stock, of which £4,366,000 is outstanding, closed November 25. Stockholders had the option of taking 60 per cent of their holding in new 4 per cent debenture stock (the total issue of which is limited to £2,620,200) or of taking repayment in full in cash, and 78 per cent of the existing debenture holders have accepted the offer to convert, while 14 per cent have asked for repayment. No reply has been received from the remaining 8 per cent.

Applications for additional allotments beyond that to which holders were entitled under the conversion scheme amount to over £2,000,000 ($10,000,000), so that only a comparatively small allotment can be made on these applications.

Monsanto Earnings

Edgar M. Queeny, president of the Monsanto Chemical Company, announced on December 1 that in accordance with the decision of the board of directors employes, as well as stockholders, will participate in the earnings of the company for the current year. The directors at their regular quarterly meeting declared an extra dividend of 75 cents a share in addition to the regular dividend of 31¼ cents a share. Both dividends are payable December 29 to stockholders of record on December 10.

The directors also voted bonuses to all employes who are not already working under the company's bonus plan. Employes who have been with the company for a year or more will receive a full week's pay December 22. Those who have been in the employ of the company for less than a year will receive proportionate bonuses. Executives, technicians, salesmen, foremen, and others whose contribution to the company's earnings can be adequately measured have been working under a bonus plan for the past few years.

Payment of the regular quarterly dividend on December 29 instead of on January 2, as has been the custom in the past, will constitute a total dividend payment of $2.31¼ a share for 1933. In issuing the statement, Mr. Queeny said: "It is estimated that our 1933 earnings will not fall very short of $5.00 a share. Earnings for the first nine months of the year were $1,519,704 or $3.51½ a share. Sales thus far in the fourth quarter have held up satisfactorily and our present position warrants the action of the board of directors. Future dividend policy will depend upon conditions."

Firestone Shows Profit

Although profits of the Firestone Tire and Rubber Company for the fiscal year ended October 31 were considerably less than half those of the preceding twelve months, important progress was made in the face of adverse conditions, according to the annual report issued on December 1 by Harvey S. Firestone, president.

Firestone and subsidiaries report net profit of $2,397,059 after interest, depreciation, Federal taxes, etc., equal to $5.13 a share on 466,902 shares of Series A cumulative 6 per cent preferred stock. This compares with net profit in the fiscal year ended October 31, 1932, of $5,151,978, equal after preferred dividends, to $1.07 a share on the 1,986,189 shares of $10 par common, excluding stock in the treasury.

Net sales of $75,402,268 in the last fiscal year compared with sales of $84,337,173 in 1932, $113,797,282 in 1931 and $120,018,663 in 1930.

Current Assets Rise

Current assets as of October 31, including $14,320,030 cash, amounted to $56,766,302 and current liabilities were $6,563,144. This compares with cash of $13,167,848, current assets of $53,262,247 and current liabilities of $3,923,386 at the end of the 1931-'22 fiscal year.

The consolidated income account for the year ended October 31 compares as follows:

	1933	1932
Net sales	$75,402,268	$84,337,173
Costs and exp.	65,718,650	72,960,392
Operating profit	$9,683,618	$11,376,781
Other income	673,302	1,105,561
Total income	$10,356,920	$12,482,342
Depreciation	5,625,097	5,211,893
Interest paid	980,396	1,200,190
Liberia dev. exp.	196,385	180,272
Fed. tax, etc.	$1,157,983	‡572,769
§Adj. of foreign subs.	.....	165,240
Net profit	$2,397,059	$5,151,978
6% pf. divs.	2,814,966	3,024,432
Com. divs.	1,037,340	2,041,422
Deficit	$1,455,247	†$86,624

† Surplus. ‡ Includes minority interest in subsidiaries' operations. § Adjustment operating results of foreign subsidiaries due to fluctuations in exchange rates.

The consolidated balance sheet as of October 31 compares as follows:

ASSETS

	1933	1932
*Land, bldgs., mach., etc.	$58,945,411	$62,413,057
F. Pk. Ltd. Co.	1,909,867	1,874,569
Inventories	28,541,261	26,826,144
Securities at cost	2,353,330	2,304,376
Inv. of sub, co., etc.	3,044,385	6,150,000
Mis. accts., adv., etc.	2,135,386	1,984,813
Cash	14,320,030	13,167,848
Receivables	13,905,011	13,268,256
Emp. stock contr.	2,748,013	3,096,360
Deferred charges	1,622,517	1,554,218
Total	$129,525,211	$132,639,641

LIABILITIES

6% pf. series A	$46,690,200	$47,418,100
‡Common stock	19,708,490	19,861,890
Bonds of subsids.	18,962,800	19,430,300
Accounts payable	3,842,485	2,040,726
Accr. taxes, int., etc.	2,720,660	1,882,660
Minority interest	985,252	1,320,074
Res. for inv. and fluc., exchange, etc.	2,800,000	4,689,453
Earned surplus	$31,841,391	31,147,375
Capital surplus	1,973,933	2,099,800
Ins. account surplus	.....	2,749,263
Total	$129,525,211	$132,639,641

* After depreciation. ‡ Par $10. § After crediting $2,149,263 excess insurance reserve.

Du Pont Dividend

Directors of E. I. du Pont de Nemours & Co., declared on November 20 an extra dividend of 75c a share and the regular quarterly dividend of 50c a share on the 11,048,311 common shares. The regular dividend of $1.50 was also declared on the company's debenture stock.

United Carbon Dividend

United Carbon Co. recently declared a quarterly dividend of 40 cents on the common stock and the regular semi-annual dividend of $3.50 on the 7% preferred stock, both payable January 1 to stock of record December 13. The company resumed dividends this year, paying 25 cents on the common stock on July 3 and October 2, last.

Obituaries

Late Editor of The Rubber Age Dies

John Paul Bushnell, until recently Editor of THE RUBBER AGE, passed away as the result of a paralytic stroke on Thursday, November 23 in a hospital in New York City. Mr. Bushnell was born January 11, 1893, in Washington, D. C. He was educated in the Adams public school and the Webster high school in

JOHN P. BUSHNELL

Washington and was graduated from George Washington University. Following graduation he entered the export business in Baltimore and shortly after went to Chile to work in the potash mines of the Guggenheim Brothers. He returned to the United States and was commissioned as a Lieutenant in the army during the World War. Later he was employed in the export department of E. I. duPont de Nemours & Co., Wilmington, Delaware, representing that company in Cuba and Mexico until 1924 when he was appointed acting Trade Commissioner of the U. S. Department of Commerce in Mexico. Shortly after he was appointed on the Philippine Crude Rubber Expedition which reported in 1925 on the possibilities of rubber production in that country.

Upon the conclusion of that work Mr. Bushnell became editor of the *Daily Rubber Trade*, N. Y., a rubber market paper. From that position he entered the employ of THE RUBBER AGE in 1927 as Managing Editor and was advanced to Editor several years ago.

Mr. Bushnell was well known in the rubber industry, especially among crude rubber men, for he had a first-hand knowledge of rubber producing problems in addition to being an expert on the statistical position of rubber.

He is survived by his mother, Mrs. Lillian L. Bushnell, of Washington. His father, E. T. Bushnell, was connected with the U. S. Post Office until his death a few years ago. His grandfather was Asa L. Bushnell, whose father was on the staff of George Washington. Interment was in the Arlington National Cemetery, Virginia.

K. J. Thompson

Kemworthy J. Thompson, factory manager of Mansfield Tire & Rubber Co., Mansfield, Ohio, died on November 26 after a long illness. Mr. Thompson had been with Mansfield for a number of years and was well known throughout the tire industry. He was 52 years old.

TIRE AND BATTERY TRADE SUBMIT A CODE

The National Recovery Administration gave notice on December 1 that a hearing on the code of fair competition submitted by the National Tire Dealers Association, and other participating groups, claiming to represent jointly approximately 70 per cent of the volume of the trade, would be held at 10 A. M. on Thursday, December 14.

Three sets of hours are proposed. Any establishment would be permitted, under the code to elect to remain open for business less than 56 hours a week but not less than 52 hours; for 56 hours or more per week but less than 63 hours, and for 63 or more hours per week. Corresponding hours for employes would be regulated to a maximum of 40 hours a week, 44 hours a week and 48 hours per week respectively, according to the election made.

Minimum wages would run all the way from $10.00 to $14.00 a week according to the schedule of hours an establishment elected and also according to the population of the place where such establishment is located.

THERMOID TO MAKE NEW TYPE CARPET

Announcement was made early this month by President R. J. Stokes that the Thermoid Company, Trenton, N. J., makers of brake linings, belting, hose and packing, would enter the floor covering field shortly with a newly developed type of wool and worsted pile carpeting under the name of Thermoid Textile Company.

One of the mills of the company, particularly adapted for the manufacture of floor coverings, has been equipped for production which is under way. The lines will be ready to show the trade in the near future.

Harvey G. Smith has been appointed sales manager of the new company, Mr. Stokes announced. Mr. Smith has had wide experience in the sales department of W. & J. Sloane and the Mohawk Carpet Mills. Aside from his many years of experience in the selling branch of the floor covering market, Mr. Smith is well versed on all phases of carpet production.

Mr. Stokes also disclosed that W. H. Hall, Jr., superintendent of the mill, has had extensive experience in the manufacture of floor coverings, and developed the new weaving process which the firm will use in its lines. He is a graduate of the Lowell Textile Institute and was connected with the old Bigelow-Hartford mills in that city.

The company hopes to have a preshowing of its lines in New York before the opening of the spring season on February 5. No definite date has been set, however, for the introduction of the fabrics to the trade.

BATA PURCHASES SITE HERE FOR FACTORY

An agent representing Bata, A.S., large rubber footwear manufacturers of Zlin, Czechoslovakia, recently took title to 930 acres of land at Belcamp station, near Baltimore, Md., and though no definite plans were announced, it is understood that this is the first step towards starting the manufacture of Bata footwear in this country.

The agent, Vladimir Karfik, would not give any information as to the plans of his company but it was reported he would convey title to the company shortly. The property has a large frontage on Philadelphia Road, Bush River and James Run.

Options were obtained last summer on the property through Peyton B. Strobel & Co., realtors of Baltimore, and estimates for building the first unit of a plant were also obtained at that time. It was indicated, however, that those plans had been dropped, temporarily at least.

Goodyear Answers Charge

Goodyear Tire & Rubber Company filed on December 4 a formal answer in Washington, denying the charges in the complaint by the Federal Trade Commission alleging violations of the Clayton Anti-Trust Act. Goodyear denies discrimination in prices to Sears-Roebuck or secret rebates for the effect of lessening competition. The company's full position is expected to be brought out at the public hearing which will be announced shortly.

General May Acquire India

According to reports from Akron, there is a possibility that General Tire & Rubber Company would purchase the plant and assets of the India Tire & Rubber Company of Mogadore, Ohio, for a consideration said to be slightly in excess of $580,000. It is understood that negotiations have been held in recent weeks between General officials and the India Receiver, Paul C. Weick, and with representatives of the bondholders of the company. It is understood that if General acquires the plant, they would operate it on an expanded scale.

New Rubber Goods

Polly Pert Balloons

A four-color balloon, called "Polly Pert," is being offered by The Oak Rubber Company, Ravenna, Ohio. This is said to be the most elaborate "print" ever produced. It is printed on assorted color balloons, including the pastel shades. Polly Pert is presented with both blonde and brunette hair, with eyes of blue and green, beneath black lashes, and with hats of different styles and colors.

Seiberling Rubber Dolls

The Seiberling Latex Products Co., Akron, Ohio, announces a new line of all-rubber dolls. For several years the company confined production to the requirements of a well-known eastern doll company. This successful marketing brought about the decision to enter the doll business on its own account. It was decided after an investigation to offer the trade a line of "stand-up" dolls so as to provide a complete selection covering every choice.

In designing their line of "stand-up" all-rubber dolls Seiberling gave particular attention to character, play value and child appeal. Each doll in the line is full molded on cores to give uniform gauge and the natural flesh surface which stays clean. Careful attention was given to the decorating features. The eyes are painted in three colors with white balls, blue iris and black pupils. Each doll is packaged in cartons of unique design. The line includes five numbers to retail from 25c to $1.00.

Rubberized Life Rafts

A contract for 225 Navy life rafts was recently completed by the Goodyear Tire & Rubber Company. The rafts, which are made of rubberized fabric, and are boat-shaped, are standard equipment on Navy airplanes based on carriers or used for over-water flights. Each raft is equipped with oars, repair material, a bottle of carbon dioxide gas under pressure, an air pump, shears and pliers.

Packed in comparatively small zipper cases, the rafts occupy but little space in the airplane. In event a plane is forced down on the water, only a few seconds are necessary to get the raft from its case and turn the knob on the gas bottle.

Due to their boat-like shape, with raised prows and tapered lines, the rafts sit high in the water and are easy to row, and "collapsible" oars are found in pockets in each raft. The inflation tube, or body, of each raft is divided into two air-tight buoyant compartments, each capable of supporting the raft's occupants independently of the other. All seats, oarlocks, interior pockets and other equipment are designed for a maximum of strength with a minimum of weight.

The rafts are made entirely with cemented seams, a special waterproof cement having been developed to eliminate sewed seams and the possibility of the threads rotting out in the water.

Jumbo Tire for Trucks

The lowly prune, the blushing tomato and even the dusty spud, whose drab exterior hides a succulent heart, now ride in state. Crates and boxes of assorted vitamins now roll noiselessly and unobtrusively about the platforms of produce dealers where once the resounding clatter of loose-jointed steel-wheeled trucks were wont to send the echoes flying.

Heavier loads can now be carried with greater ease since the old steel-wheeled

platform trucks have been supplanted by the newer models which roll about on Streamline Jumbo Jr. tires which are actually modified airplane tail-wheel tires and wheels. (General Tire & Rubber Co.)

New Goods Briefs

The use of rubber in toys continues to increase rapidly as is indicated by the large number of new toys and novelties on the market. A few of those recently announced include the following:

. . . The new Mack type wrecking car made by Champion Hardware Co., Geneva, Ohio, has cushion type rubber tires.

. . . The Auto Coaster made by Colson Co., Elyria, Ohio, has new air balloon tires.

. . . Storm rubbers in colors for dolls are now being marketed by F. K. Braitling, Inc., Bridgeport, Conn.

. . . An all-rubber Autoracer has been introduced by Perfect Rubber Co., Mansfield, Ohio.

. . . Track pads of rubber for toy trains are being manufactured by Han-Del Mfg. Co., Philadelphia.

. . . A heavy rubber doll bath and dressing table is being marketed under the name "Rock-A-Bye" by Perfection Mfg. Co., St. Louis, Mo.

. . . An ingenious umbrella containing a pair of light rubber toe sandals concealed in its handle is being sold by Jay-Thorpe, ladies' specialty shop in New York City.

TIRE SHIPMENTS IN SEPTEMBER DECREASE

Shipments of pneumatic casings for the month of September amounted to 3,503,365 casings, a decrease of 25.6% below August but was 13.7% above September, 1932, according to statistics released by the Rubber Manufacturers Association, Inc.

Production of pneumatic casings for September were 3,999,239 casings, a decrease of 19.9% under August but was 57.5% above September 1932.

Pneumatic casings in the hands of manufacturers September 30 amounted to 7,594,506 units, an increase of 7.4% as compared with August 31 stocks and 24.6% above stocks September 30, 1932.

The actual figures are as follows:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
Sept. 1933	3,503,365	3,999,239	7,594,506
Aug. 1933	4,707,085	4,993,609	7,069,574
Sept. 1932	3,082,285	2,538,720	6,096,098

TIRE MOLDS DECLARED EXEMPTED FROM TAX

One of the most important test tax cases tried in recent years in the rubber industry was concluded on November 20 when Common Pleas Judge L. S. Pardee of Akron, Ohio, decided that molds used in the manufacture of rubber goods were exempt from taxation.

The case was brought by the B. F. Goodrich Company in October, 1932, against Jacob C. Mong, Auditor of Summit County and the Tax Commission of Ohio on the taxation of company molds valued at $1,114,340. The amount of tax involved was $15,767.

The company contended that molds were exempt from taxation under the state law which states that patterns, jigs, dies and drawings are not taxable.

The question of whether molds used in the making of tires and other rubber products should be classified as patterns or dies attracted wide-spread interest throughout the rubber industry. The case was the first of its kind to be tried in the United States.

The decision given means the saving of thousands annually to Ohio rubber companies, it was indicated.

Swedish Rubber Factory Sold

The Viskafors Rubber Factory, the oldest factory of its kind in Sweden, has been purchased by the Swedish cooperative movement, and was taken over on October 1. Swedish cooperators now own two rubber factories, the other being the Gislaved, which was bought in 1927.

When the Swedish cooperative movement bought the Gislaved factory in 1927 there were only about 300 people employed, while at present there are 1,100. In 1928 the sales were 4,180,000 Swedish crowns, and in 1932 they had risen to 9,670,000 crowns. During 1932, 1,600,000 pair of goloshes and rubber shoes, and more than 53,000 motor tires and 29,000 bicycle tires were sold.

It has been estimated that the two cooperative rubber factories will represent 33 per cent of the total rubber industry of Sweden.

RUBBER PLANTS MAKE NO-INJURY RECORDS

In the November issue of the Rubber Section, National Safety Council news letter is a report of no-injury records of three rubber factories which are said to be the best all-time records known to the Council. Up to October 18 the following were the best records reported to the Rubber Division:

1. Goodyear Tire & Rubber Company, Gadsden, Alabama, 2,483,687 man-hours. Terminated March 1, 1933.
2. Hewitt Rubber Corporation, Buffalo, New York, 1,597,075 man-hours. Terminated July 13, 1931.
3. Goodyear Tire & Rubber Company, Bowmanville, Canada, 1,373,694 man-hours. Unbroken September 12, 1933.

Each record consists of the number of continuous man-hours worked by the employes of the company without a disabling injury. A disabling injury is defined as: "Any injury arising out of and in the course of employment that results in death, permanent total disability, permanent partial disability, or temporary disability. Temporary disability is defined as: Any disability (less than death, permanent total disability, or permanent partial disability) which involves disability not confined to the day or shift on which the injury occurred."

EMERGENCY VACATIONS GRANTED BY GOODRICH

An emergency vacation program to reduce layoffs throughout the factory during the winter months, is announced by The B. F. Goodrich Company, Akron.

Under this plan workers with five years' continuous or credited service will be granted a week's leave of absence with pay. Where plant operating requirements permit, these vacations will be taken before January 1, 1934. The pay will be based on a 30 hour week. Factory supervision will also be granted similar leaves of absence with pay.

The vacation program developed with the cooperation of factory representatives recently elected in a factory-wide poll under provisions of the Goodrich Cooperative Plan, will make possible the continuance of work for many employees who might otherwise be subject to layoffs.

Fifty-seven per cent of the Goodrich factory workers are being given paid leaves-of-absence under this plan.

L. J. SCHOTT CO.
P. O. BOX 124, E. AKRON STAT.
AKRON - - - - OHIO

Buyers of Surplus and Obsolete Rubber Chemicals, Colors, Fabrics, &c.

REVIEW SHELF

• Monthly Review of New Books, Pamphlets, Company Catalogs, Service Bulletins, House Organs, etc., Pertinent to the Industry.

FACTICE IN RUBBER COMPOUNDING. 1933 edition. Stamford Rubber Supply Co., Stamford, Conn. 14 pp.

This booklet has been revised and brought up-to-date and covers all new uses of Factice as well as describing a number of new products such as Amberex, Emo and Dispersed Factice. It serves to keep chemists posted on the wide applications of these materials in various types of rubber products.

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DATA SHEETS ON CALCENE, report by Columbia Alkali Corp., Barberton, Ohio, on properties of Calcene. 12 pp., illustrated with charts.

This report describes the uses of Calcene, a new reinforcing calcium carbonate pigment for rubber. It contains 8 charts showing the results obtained by using this material in various different rubber stocks. Calcene is suggested by its makers whenever a stock with high tensile, good elongation and high resistance to abrasion and tear is desired.

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FORESTALLING LABOR TROUBLES. No. 4 in a series of Booklet-Editorials. By Allen W. Rucker in collaboration with N. W. Pickering. Issued by Farrel-Birmingham Co., Inc., Ansonia, Conn. Paper cover booklet. 11 pp. For free distribution.

The following facts are brought out in this booklet: I. Labor disputes increase in a period of rising prices. 2. The industries which suffer least are those in which there have been the greatest development in machine efficiency and the highest productivity per worker.

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PUBLICATIONS RELATING TO RUBBER. Letter Circular LC 178. Revised to September 21, 1933. Distributed without charge by the Bureau of Standards, Department of Commerce, Washington, D. C. 10 pp.

The Letter Circular contains a classified list of publications on rubber by members of the staff of the Bureau of Standards. The contents are as follows: I. General Information on rubber; II. Publicity regarding work of the Bureau of Standards on rubber; III. Purification of rubber; IV. Properties of rubber; V. Dimensional measurements on rubber specimens; VI. Performance of rubber products; VII. Chemical analysis of rubber; VIII. Physical testing of rubber; IX. Specifications for rubber goods.

VANDERBILT NEWS, Vol. 3, No. 6. November-December, 1933 issue. R. T. Vanderbilt Co., New York City.

This issue contains in addition to articles on Vendex, Rayox and Bondogen, several papers by outside authorities, as follows: "Adhesion of Rubber to Brass Plate Metal," by W. J. McCortney; "The Impact Resiliometer," by Paul Lupke, Jr.; "Rubber Beaker Rings for Accelerating Evaporation on Steam Bath," by J. A. Scherrer. This issue also contains an article on Low Sulphur and High Acceleration for Heat Resisting Compounds and notes on Adhesion of Rubber to Metal.

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CHEMICAL FORMULARY, published by Chemical Formulary Co., 950 Third Ave., Brooklyn, N. Y., Vol. 1, 1933-1934. Cloth covered, 537 pp., $6.00.

This new book, of which this is the first edition, contains a valuable collection of formulae for making many thousand different products. The editor, H. Bennett, states in the preface that, "a definite need has existed for an up-to-date compilation of formulae for chemical compounding and treatment." So that all fields would be covered, assistance was obtained from an editorial board consisting of a large number of experts from various industries. The book is divided into 38 chapters and several tables and indices. The headings cover a wide range from Adhesives to Waterproofing and include such items as Beverages, Cosmetics, Emulsions, Explosives, Fuels, Ink, Lacquers, Metals, Oils, Paper, Plastics, Rubber, Silk and others. The chapter on rubber contains formulae for various types of products taken mostly from published literature furnished by supply houses and has little not known to the average rubber chemist or engineer. To others, however, the chapter undoubtedly has much information of value.

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PRESSURE INSTRUMENTS. Bulletin No. 185. Issued by the Foxboro Company, Foxboro, Mass. Paper cover. 40 pp.

This catalog contains descriptions and numerous illustrations of the Foxboro line of Recording, Controlling and Indicating Gauges and Accessories. It also contains hints in selecting gauges, charts and gauge boards, and other valuable information.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, DECEMBER 9, 1933

Crude Rubber

SINCE our last report the market has been influenced mainly by the course of sterling and the talks on rubber restriction. As sterling advanced rubber also rose and as reports from abroad indicated that restriction was imminent, quotations jumped only to drop back as the reports were either unverified or appeared to indicate a postponement to a later date. The talks in Batavia last month resulted in the submission of a report recommending the quota system of rubber control for native rubber. The report on December 7 that the D.E.I. was unwilling to give up its interests to an international rubber council without getting certain guarantees caused a downward flurry in prices but this has now been discounted. Quotations on the outside market, Commodity Exchange, London and Singapore, follow:

Plantations—

Ribbed Smoked Sheets—			
Spot		@	.08⅞
December	—	@	.08⅞
Jan.-March	—	@	.09
First Latex, crepe spot	—	@	.10½
Amber Crepe, No. 2	—	@	.06¾
Amber Crepe, No. 3	—	@	.06⅝
Amber Crepe, No. 4	—	@	.06½
Brown Crepe, clean thin	—	@	.06¾
Brown Crepe, rolled	—	@	.05⅞

Latex—

Liquid Latex, per gal.	.72	@	—

Paras—

Up River, fine	—	@	.09
Acre Bolivian, fine	—	@	.09¼

Balata—

Block, Ciudad	—	@	.25

LONDON MARKET

Standard Smoked Sheets—Buyers—Dec. 9			
December	—	@	4 5/32d
Jan.-Mar.	—	@	4 5/32d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—Dec. 9			
December	—	@	3 33/64d
Jan.-Mar.	—	@	3 33/64d

Reclaimed Rubber

No effect has been felt as yet in the prices of reclaims due to the possibility of rubber restriction. As the talks abroad reveal definite signs of some form of restriction it is expected that reclaims will rise. Demand at this time is light with quotations unchanged. Production and consumption in October was slightly under September but the percentage to crude rose slightly. Current quotations follow:

High Tensile

High Tensile Red	lb.	.06½ @	.06¾
Super-Reclaim Black	lb.	.07 @	.07½

Shoe

Washed	lb.	.08 @	.09
Unwashed	lb.	.06½ @	.06¾

Tube

No. 1 (Floating)	lb.	.11 @	—
No. 2 (Compounded)	lb.	.06¾ @	.06½

Tires

Black	lb.	.04¾ @	.05
Black, selected tires	lb.	.05 @	.05¼
Dark Gray	lb.	.05¾ @	.06
White	lb.	.07 @	.07¼
Truck, Heavy Gravity	lb.	.05¼ @	.05½
Truck, Light Gravity	lb.	.05¾ @	.06

Miscellaneous

Mechanical blends	lb.	.04 @	.04¼

Scrap Rubber

Demand for scrap has declined somewhat from the levels of the past few months as reclaimers have lowered their production schedules. Collections are fair with an increase expected as prices rise. No change in the quotations is looked for soon unless crude makes a rapid rise. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	18.00	@19.00
Mixed auto	ton	10.00	@11.00
Clean solid truck tires	ton	31.00	@33.00
Boots and shoes	ton	25.00	@27.00
Arctics, untrimmed	ton	18.00	@20.00
Inner tubes, No. 1	lb.	.05 @	.05¼
Inner tubes, No. 2	lb.	.02½ @	.02¾
Inner tubes, Red	lb.	.02⅜ @	.02½

Cotton

Spot cotton has fluctuated but little since our last report confining its range between 10.05 to 10.40 with an average price for November of 10.038 cents, compared to 9.58 for October. Trading in general has been quiet especially last week when the Government report was being awaited. When announced the figure of 13,100,000 bales was so close to private estimates, that it had little influence on the market. Mills have been buying in small volume and growers were holding their cotton for higher prices. Mills are operating at 75% of their code requirements as demand is light. Quotations on the N. Y. Cotton Exchange for Middling Upland on December 9 follow:

	Nov. 9 Close	December 9 High	December 9 Low	December 9 Close
December	9.83	9.99	9.89	9.99
March	10.06	10.15	10.04	10.12
May	10.21	10.28	10.15	10.27

Tire Fabrics

(Prices Net at the Mill—Process Tax Included)

Peeler, carded, 23/4/3	lb.	.45½ @	—
Peeler, carded, 23/5/3	lb.	.44½ @	—
Peeler, carded, 13/3/3	lb.	.41½ @	—
Peeler, carded, 15/3/3	lb.	.42½ @	—
Egyptian, carded, 23/5/3	lb.	.52 @	—
Egyptian, combed, 23/5/3	lb.	.54 @	—
CHAFERS			
Carded, American, 1 1/16"	lb.	.38 @	.39
Carded, American, 1"	lb.	.32 @	—
LENO BREAKER			
Carded, American, 1 1/16"	lb.	.38 @	.39
Carded, American, 1"	lb.	.32 @	—

Sheetings

40 inch, 2.50 yard	yd.	.10 @	—
40 inch, 2.85 yard	yd.	.08⅝ @	—
40 inch, 3.15 yard	yd.	.10⅜ @	—
40 inch, 3.60 yard	yd.	.09 @	—
40 inch, 3.75 yard	yd.	.07⅜ @	—
40 inch, 4.25 yard	yd.	.06½ @	—

Ducks

Enameling	lb.	.32 @	.33
Belting and Hose	lb.	.30 @	—
Single filling, A grade	lb.	.16 @	.16½
Double filling	lb.	.17 @	.17½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 Tons

FROM NOVEMBER 10 TO DECEMBER 9

Date		Spot	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Sales
Nov.	10	8.50	8.50	8.57	8.80	8.94	9.10	9.25	9.43	9.55	9.68	9.78	9.88	9.98	——	577
	11	8.38	8.46	8.58	8.73	8.88	9.04	9.17	9.31	9.42	9.55	9.65	9.76	9.86	——	174
	12	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	13	8.63	8.65	8.71	8.88	9.03	9.19	9.31	9.45	9.57	9.70	9.77	9.85	9.95	——	575
	14	8.87	8.80	8.90	9.10	9.25	9.41	9.55	9.71	9.82	9.94	10.04	10.14	10.24	——	987
	15	8.88	8.87	8.97	9.14	9.31	9.51	9.63	9.79	9.89	10.00	10.10	10.20	10.30	——	911
	16	9.13	9.09	9.19	9.36	9.52	9.68	9.81	9.94	10.05	10.18	10.28	10.38	10.48	——	790
	17	8.75	8.62	8.72	8.89	9.05	9.23	9.38	9.56	9.68	9.82	9.93	10.05	10.15	——	646
	18	8.75	8.80	8.90	9.08	9.26	9.44	9.57	9.71	9.83	9.95	10.05	10.15	10.25	——	148
	19	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	20	9.06	9.00	9.07	9.26	9.44	9.63	9.78	9.95	10.07	10.19	10.29	10.39	10.49	——	626
	21	8.94	8.90	8.91	9.09	9.27	9.46	9.61	9.79	9.86	9.95	10.07	10.20	10.32	——	489
	22	9.00	8.98	8.99	9.17	9.33	9.50	9.64	9.79	9.89	10.00	10.11	10.22	10.33	——	332
	23	8.88	8.86	8.88	9.06	9.23	9.42	9.55	9.70	9.81	9.92	10.02	10.12	10.22	——	742
	24	9.12	9.07	9.07	9.26	9.44	9.62	9.74	9.86	9.97	10.09	10.19	10.29	10.39	——	653
	25	9.06	9.07	9.07	9.20	9.37	9.55	9.67	9.80	9.92	10.04	10.14	10.24	10.34	——	165
	26	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	27	8.30	——	8.29	8.45	8.61	8.77	8.93	9.09	9.22	9.35	9.47	9.60	9.72	——	852
	28	8.44	——	8.45	8.62	8.79	8.97	9.10	9.24	9.34	9.44	9.52	9.60	9.67	——	739
	29	9.00	——	8.94	9.13	9.26	9.39	9.51	9.64	9.74	9.85	9.93	10.02	10.10	——	414
	30	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
Dec.	1	9.25	——	9.18	9.33	9.46	9.61	9.73	9.87	10.00	10.12	10.21	10.30	10.40	10.50	291
	2	9.20	——	9.15	9.30	9.44	9.59	9.72	9.85	9.96	10.08	10.17	10.25	10.34	10.43	79
	3	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	4	9.15	——	9.15	9.28	9.40	9.52	9.65	9.78	9.89	10.00	10.11	10.23	10.34	10.45	229
	5	9.00	——	8.90	9.02	9.13	9.26	9.39	9.54	9.64	9.75	9.85	9.95	10.05	10.15	545
	6	8.88	——	8.85	8.98	9.10	9.22	9.33	9.45	9.56	9.67	9.77	9.87	9.97	10.07	187
	7	9.00	——	8.95	9.06	9.20	9.35	9.45	9.56	9.65	9.74	9.83	9.92	10.01	10.10	130
	8	8.50	——	8.40	8.52	8.62	8.72	8.83	8.94	9.04	9.15	9.25	9.35	9.45	9.55	820
	9	8.75	——	8.65	8.77	8.87	8.97	9.07	9.18	9.27	9.40	9.50	9.60	9.70	9.80	170

Rubber CHEMICAL Markets

NEW YORK, December 11, 1933

ACCELERATORS

Organic				
A-1	lb.	.21	@	.25
A-5-10	lb.	.33	@	.36
A-7	lb.	.53	@	.65
A-11	lb.	.60	@	.75
A-16	lb.	.55	@	.65
A-19	lb.	.56	@	.75
A-32	lb.	.70	@	.80
Aldehyde ammonia, crystals	lb.	.65	@	.67
Altax	lb.			
Captax	lb.			
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.42	@	.43
Diphenylguanidine	lb.	.33	@	.34
Ethylidene aniline	lb.	.45	@	.47½
Formaldehyde aniline	lb.	.37½	@	.42
Guantal	lb.	.42	@	.51
Heptene	lb.	.40	@	—
Hexamethylene-tetramine	lb.	.37	@	—
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	3.25	@	—
Oxynone	lb.	.68	@	.80
Phenex	lb.	.50	@	.55
Pipsol X	lb.	3.55	@	4.00
R & H 40	lb.	.40	@	.41
R & H 50	lb.	.40	@	.41
R-2	lb.	1.55	@	1.90
R-2 Base	lb.	4.55	@	5.00
Safex	lb.	1.20	@	1.25
SPDX	lb.	.75	@	—
Super-Sulphur No. 1	lb.			
No. 2	lb.			
Thiocarbanilid, drums	lb.	.25	@	.27
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.58	@	.60
Tuads	lb.			
Ureka	lb.	.75	@	1.00
Ureka C	lb.	.58	@	.69
Vulcanex	lb.			
Vuleone	lb.			
Vulcanol	lb.			
Z-88-P	lb.	.48	@	.60
Zimate	lb.			
Inorganic				
Litharge, domestic	lb.	.05¾	@	—
Magnesia, calcined, heavy, cwt.		4.00	@	4.50

COLORS

Blacks (See Compounding Materials)				
Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.06	@	.30
Browns				
Sienna, Italian	lb.	.04	@	.06
Umber, Turkey	lb.	.04	@	.06
Greens				
Chrome, light	lb.	.23	@	.26
medium	lb.	.26	@	.28
dark	lb.	.28	@	.33
Chromium Oxide, bbl.	lb.	.23	@	.27
Reds				
Antimony				
crimson, 15/7	lb.	.40	@	—
sulfur, free	lb.	.52	@	.56
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.08¾	@	—
Whites				
Cryptone CB, No. 21	lb.	.06½	@	.06¾
Cryptone, No. 19	lb.	.06½	@	.06¾
Lithopone, Albalith	lb.	.04½	@	.04¾
Lithopone, Azolith	lb.	.04½	@	.04¾
Titanium oxide	lb.	.17	@	.19
Titanox B	lb.	.06	@	.06½
Titanox C	lb.	.06	@	.06½
XX Zinc Sulphide, bbls.	lb.	—	@	.13
Zinc Oxide—American Process				
American Azo:				
ZZZ (lead free)	lb.	.05¾	@	.06
ZZ (leaded)	lb.	.05½	@	.05¾
Horsehead Lead Free Brand:				
Selected	lb.	.05¾	@	.06
Special	lb.	.05¾	@	.06
XX Red	lb.	.05¾	@	.06
XX	lb.	.05¾	@	.06
XX Green	lb.	.05¾	@	.06
Leaded Brand, Standard	lb.	.05¼	@	.05¾
Sterling	lb.	.05¼	@	.05¾
Superior	lb.	.05¼	@	.05¾
Lehigh	lb.	.05¼	@	.05½
U. S. P., bbls.	lb.	—	@	.12¾
Kadox, black label	lb.	.09⅝	@	.09⅞
Blue label	lb.	.08⅝	@	.08⅞
Red label	lb.	.07⅛	@	.07⅓
St. Joe, black label	lb.	.05¾	@	.06
green label	lb.	.05¾	@	.06
red label	lb.	.05¾	@	.06
Zinc Oxide—French Process				
Anaconda, lead free	lb.	.05¾	@	.06
Anaconda, selected lead free	lb.	.06¼	@	.06½
Florence White seal, bbls.	lb.	—	@	.10⅞
Green seal	lb.	.09⅝	@	.09⅞
Red seal	lb.	.08⅝	@	.08⅞
Yellows				
Chrome	lb.	.16	@	.16½
Ocher, dom. med.	lb.	.01½	@	.02

BLACKS

Arrow "Aerfloted"				
c.l. f.o.b. works, bags	lb.	.02¾	@	—
c.l. f.o.b. works, cases	lb.	.04¼	@	—
less c.l. f.o.b. works	lb.	.05¼	@	.07
Arrow "Aerfloted" Specification, c.l. f.o.b. wks., bags	lb.	.03	@	—
Bone, powdered	lb.	.05½	@	.12½
Carbon, compressed	lb.	.02¾	@	.07
uncompressed	lb.	.02¾	@	.07
"Certified," Cabot				
c.l. f.o.b. works, bags	lb.	.02¾	@	—
c.l. f.o.b. works, cases	lb.	.04¼	@	—
less c.l. f.o.b. works	lb.	.05¼	@	.07
Spherons	lb.	.02¾	@	—
"Disperso" f.o.b. La.	lb.	.028	@	.071
f.o.b. Texas	lb.	.02¾	@	.07
Drop, bbls.	lb.	.05½	@	.14
"Excello," compressed	lb.	.03	@	—
"Fumonex"	lb.	.03	@	.07
"Gastex"	lb.	.03	@	.07
Lampblack	lb.	.06	@	.08
"Micronex"				
c.l. f.o.b. works, bags	lb.	.03	@	—
c.l. f.o.b. works, cases	lb.	.04½	@	—
less c.l. f.o.b. works	lb.	.05½	@	.07
"Supreme"	lb.	.02¾	@	—
Thermatomic—"P 33"	lb.	—		—
"Thermax"	lb.	—		—
United, "Dixie" and "Kosmos"				
c.l. f.o.b. works, bags	lb.	.02¾	@	—
c.l. f.o.b. works, cases	lb.	.04¼	@	—
less c.l. f.o.b. works	lb.	.05¼	@	.07
"Velvetex"	lb.	.02½	@	.05

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85	@	24.50
Ammonia carbonate, lump	lb.	10½	@	.12
Asbestine	ton	15.00	@	—
Barium carbonate (98-100%)	lb.	.05	@	—
Barium Dust	lb.	.06	@	.06
Barytes southern off-color	ton	10.00	@	18.00
Western prime white	ton	23.00	@	—
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Carrara filler	lb.	.01¾	@	.02
Catalpo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt.	ton	60.00	@	75.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	6.00	@	7.00
Aerfloted, Suprex	ton	6.50	@	8.00
Congaree	ton	9.00	@	—
Dark Blue Ridge	ton			
Dixie	ton			
Langford	ton			
Lexington	ton	10.00	@	22.00
Par	ton			
Tensulite		15.00	@	—
Cotton Flock	lb.	.08	@	.16
Glues, extra white	lb.	.15	@	.22
medium white	lb.	.12	@	.14
Kalite No. 1	ton	30.00	@	55.00
Kalite No. 3	ton	40.00	@	65.00
Magnesia, carbonate	lb.	.06	@	.06¾
Mica	lb.	.04	@	—
Rottonstone (powdered)	ton	23.50	@	28.00
Soapstone, powdered	ton	16.00	@	18.00
Starch, powdered	cwt.	2.50	@	2.60
Talc, domestic	ton	12.00	@	15.00
Pyrax A	ton			
Whiting, commercial	cwt.	.85	@	1.10
English cliffstone	cwt.	1.50	@	1.70
Sussex	ton			
Witco	ton	20.00	@	—
Zinc Carbonate	lb.	.10¼	@	—
Zinc Stearate	lb.	.20½	@	.21

MINERAL RUBBER

Genasco (factory)	ton	30.00	@	43.00
Granulated M R	ton			
Hard Hydrocarbon	ton			
Parmr. solid	ton	23.00	@	28.00
Pioneer, MR, solid	ton	40.00	@	42.00
Pioneer-granulated	ton	50.00	@	52.00

SOFTENERS

Acids				
Nitric, 36 degrees	cwt.	5.00	@	5.25
Sulfuric, 66 degrees	cwt.	1.55	@	1.80
Tartaric, crystals	lb.	.23½	@	—
Acids, Fatty				
Laurex	lb.	.15	@	.16
Stearex	lb.	.08	@	.12
Stearic, double pressed	lb.	.08	@	.12
Alkalies				
Caustic Soda, 76%	cwt.	2.55	@	—
Soda Ash, 58% C.L.	cwt.	1.20	@	1.35
Oils				
Corn, refined, bbls.	lb.	—	@	.06¾
Cottonseed, crude	gal.	—	@	.04
Cycline Oil	gal.	.15	@	.28
Degras (c.l. 100 bbls.)	lb.	.02¾	@	—
Less c.l. (10-25 bbls.)	lb.	.03	@	—
Lots less than 10 bbls.	lb.	.03¼	@	—
Fluxrite	lb.	.05½	@	.06½
Palm Lagos	lb.	.04½	@	—
Niger	lb.	.02¾	@	.03
Para-Flux	gal.	.17	@	—
Petrolatum, light	lb.	.02½	@	—
Pigmentaroil	gal.	.13	@	.18
Pine, steam distilled	gal.	.59	@	.61
destructively distilled	gal.	.56	@	.58
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07½	@	—
Witco Softener (f.o.b. wks.)	lb.	.02	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05	@	.06
coal tar	gal.	.05½	@	.06
pine, 200 lb. gr. wt.	bbl.	6.00	@	—
Rosin, grade K, 290 lb.	bbl.	5.50	@	—
Pigmentar	gal.	.13	@	.18
Tar Retort, 50 gal.	bbl.	9.50	@	10.00
Solvents				
Acetone, pure	lb.	.10	@	—
Alcohol, denatured, No. 1 bbls.	gal.	.30½	@	.41½
Benzol, 90%	gal.	.20	@	.22
Carbon, bisulfide	lb.	.05	@	.06
Carbon, tetrachloride	lb.	.05¼	@	.06
Dipentene	gal.	.31	@	.41
Dryolene (f.o.b. Okla.)	gal.	.10	@	.16½
Ethylene dichloride	lb.	.05	@	.06
Gasoline, steel bbls.	gal.	.16	@	—
Naphtha, solvent	gal.	.26	@	.31
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	—
Turpentine, spirits	gal.	.55	@	—
wood	gal.	.50	@	—
destructively distilled	gal.	.45	@	—
Waxes				
Beeswax, white	lb.	.30	@	.32
Carnauba	lb.	.25	@	.26
Ceresin, white	lb.	.10	@	.11
Montan, crude	lb.	.05	@	.06
Ozokerite, black	lb.	.24	@	.25
green	lb.	.26	@	.30
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	.03½
White crude scale 124/126	lb.	.02	@	.02½
Refined, 125/127, 138/140	lb.	.03	@	.07

ANTI-OXIDANTS

AgeRite, Gel	lb.			
Powder	lb.			
Resin	lb.			
White	lb.			
Albasan	lb.	.70	@	.75
Antox	lb.			
R-L-E	lb.	.57	@	.60
Flectol A and Flectol-B	lb.	.54	@	.62
Neozone	lb.			
Oxynone	lb.	.68	@	.80
Resistox	lb.	.52	@	.65
Retardex	lb.	.35	@	.40
Stabilite	lb.	.57	@	.62
Stabilite Alba	lb.	.70	@	.75
VGB	lb.	.55	@	.60

SPECIALTIES

Aromatics Rodo	lb.			
Para-Dors No. 5145	lb.	2.00	@	—
Sunproof	lb.	.35	@	.37½
Sponge Paste	lb.	—	@	.30
Tonox	lb.	.58	@	.60

MOLD LUBRICANTS

Dipex	lb.	.06	@	.08
Sericite, f.o.b. N. Y.	ton	$65.00	@	—
Zip	lb.	—	@	—

SUBSTITUTES

Black	lb.	.06	@	.08
White	lb.	.07½	@	.12
Brown	lb.	.06½	@	.11

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.04	@	—
Sulfur flour.				
Ref'n'd. 100% pure (bags)	cwt.	2.40	@	2.75
Commercial (bags	cwt.	1.75	@	2.10
Telloy	lb.			
Vandex	lb.			

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89	30,205	9,316,205	13.77	451,877
1931	497,138	72,918,949	6.54	25,595	4,255,472	7.42	471,543
1932	409,584	31,936,459	3.47	20,929	2,015,612	4.30	388,655
1931:							
Aug.	38,669	5,138,404	5.93	2,324	345,953	6.65	36,345
Sept.	38,494	4,970,324	5.76	1,362	187,431	6.14	37,132
Oct.	41,131	4,803,582	5.21	1,527	203,574	5.95	39,604
Nov.	43,345	4,742,218	4.72	1,403	198,284	6.31	43,345
Dec.	53,536	5,610,120	4.68	2,462	326,382	5.91	51,070
1932:							
Jan.	33,221	3,387,505	4.55	1,524	185,466	5.43	31,697
Feb.	27,959	2,690,250	4.29	1,915	222,584	5.19	26,044
Mar.	45,197	4,251,801	4.19	2,227	240,128	4.84	42,970
April	37,903	3,181,343	3.74	2,128	196,934	4.53	35,775
May	34,182	2,798,914	3.71	1,505	144,561	4.30	32,677
June	40,808	2,647,085	2.89	1,981	134,336	3.02	39,136
July	32,306	2,102,915	2.91	2,030	179,699	3.95	30,276
August	33,449	2,027,045	2.71	1,339	128,952	4.29	32,110
Oct.	35,096	2,436,522	3.10	1,059	98,022	4.13	34,037
Nov.	28,908	2,263,469	3.48	1,745	158,618	4.06	27,163
Dec.	31,384	2,360,061	3.34	770	66,165	3.98	30,614
1933:							
Jan.	29,822	2,213,828	3.03	1,403	109,916	3.49	28,419
Feb.	22,603	1,554,086	3.12	1,244	102,129	3.73	21,359
Mar.	27,936	1,867,657	2.98	1,127	86,216	3.42	26,809
April	20,240	1,291,136	2.85	798	70,111	3.92	19,442
May	26,002	1,694,963	2.93	1,842	189,451	4.59	24,894
June	22,900	1,780,495	3.47	1,276	156,168	5.46	21,624
July	44,625	4,293,111	4.29	1,419	219,945	6.92	43,206
August	44,257	5,391,709	5.44	2,205	302,132	6.12	42,052
Sept.	44,912	6,110,956	6.07	2,369	335,798	8.89	42,543
Oct.	44,474	6,115,330	6.14	2,669	397,167	6.64	41,805

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,677
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	566,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1931	——	——	1,208	411,692	5,777	1,019,010	4,650	884,355
1932	——	——	708	147,403	4,607	616,596	5,085	601,999
1932:								
Nov.	——	——	134	15,983	163	20,296	526	70,785
Dec.	——	——	22	5,209	276	36,298	632	79,250
1933:								
Jan.	——	——	33	7,815	357	40,586	841	100,900
Feb.	——	——	12	2,923	391	52,171	367	46,037
Mar.	——	——	45	11,963	437	56,262	539	55,731
April	——	——	7	2,054	210	26,856	794	80,794
May	——	——	35	9,869	463	55,560	734	71,008
June	——	——	759	1,514,296	466	61,229	604	66,827
July	——	——	238	76,141	638	79,049	618	85,636
Aug.	——	——	272	527,147	390	55,509	1,156	196,138
Sept.	——	——	65	30,738	761	149,296	1,343	267,516
Oct.	——	——	119	47,663	542	99,249	1,561	310,531

(1) Latex import figures not available before 1924. Weight given in pounds of dry rubber contained in latex.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1926	1927	1928	1929	1930	1931	1932	1933
Jan.	32,196	31,518	34,403	43,002	36,194	28,557	27,962	21,661
Feb.	31,136	30,137	33,702	41,594	33,302	28,797	30,011	21,638
Mar.	32,936	36,141	35,688	44,730	35,540	32,788	27,828	18,047
Apr.	32,696	35,871	32,772	47,521	39,686	33,321	25,953	26,226
May	29,364	34,592	37,333	49,233	39,386	37,817	30,597	44,580
June	28,598	33,801	37,676	43,227	34,195	37,916	41,475	51,326
July	27,577	29,219	37,407	41,526	29,508	31,397	29,976	50,184
Aug.	34,533	33,460	42,927	38,274	30,850	27,586	22,372	44,939
Sept.	32,904	27,214	39,882	34,707	25,515	23,638	22,491	35,686
Oct.	29,936	26,790	40,857	34,800	27,516	22,277	22,286	31,906
Nov.	28,080	26,792	37,461	27,659	23,691	22,943	21,910	——
Dec.	26,293	25,492	31,232	25,531	21,687	21,409	16,990	——
Tot.	366,149	371,027	441,340	469,804	375,980	348,986	313,122	——

Figures on Quarterly Basis

Quarter	1926	1927	1928	1929	1930	1931	1932	1933
Jan./Mar.	94,301	99,216	103,558	128,565	101,610	89,652	85,309	64,211
Apr./June	87,109	103,242	103,500	139,292	112,229	107,755	92,643	121,445
July/Sept.	93,793	89,210	117,573	113,746	85,261	83,632	72,523	——
Oct./Dec.	83,212	80,860	117,597	84,872	72,020	65,645	64,145	——
Totals	358,415	372,528	442,227	466,475	371,120	346,684	314,620	——

Note—The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1922	57,834	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,588	48.4	27,464
1925	132,930	137,105	35.6	13,203	1930	157,967	153,497	40.8	22,800
1926	180,582	164,500	45.9	23,213	1931	133,351	124,126	33.9	19,257
1932:									
Jan.	8,753	8,440	30.2	18,712	July	5,417	5,131	18.1	16,333
Feb.	8,731	8,332	27.7	18,659	Aug.	3,264	4,382	18.6	14,629
Mar.	8,613	7,420	26.7	19,721	Sept.	5,308	5,235	23.2	14,059
Apr.	5,561	5,555	21.6	21,525	Oct.	6,605	5,494	26.1	13,911
May	5,024	6,070	20.8	18,889	Nov.	6,542	5,234	23.9	14,047
June	5,923	7,031	18.0	16,870	Dec.	5,626	3,968	23.4	15,202
1933:									
Jan.	5,245	4,506	20.8	15,117	July	12,049	10,317	20.6	14,108
Feb.	4,530	4,087	18.9	15,403	Aug.	11,708	9,446	21.0	15,037
Mar.	3,847	3,454	19.1	15,496	Sept.	10,435	7,727	21.7	15,869
Apr.	4,617	4,407	16.8	14,370	Oct.	9,466	7,212	22.6	17,748
May	8,366	7,770	17.4	13,734	Nov.	.....	.....	...	.....
June	10,591	9,674	18.8	13,231	Dec.	.....	.....	...	.....

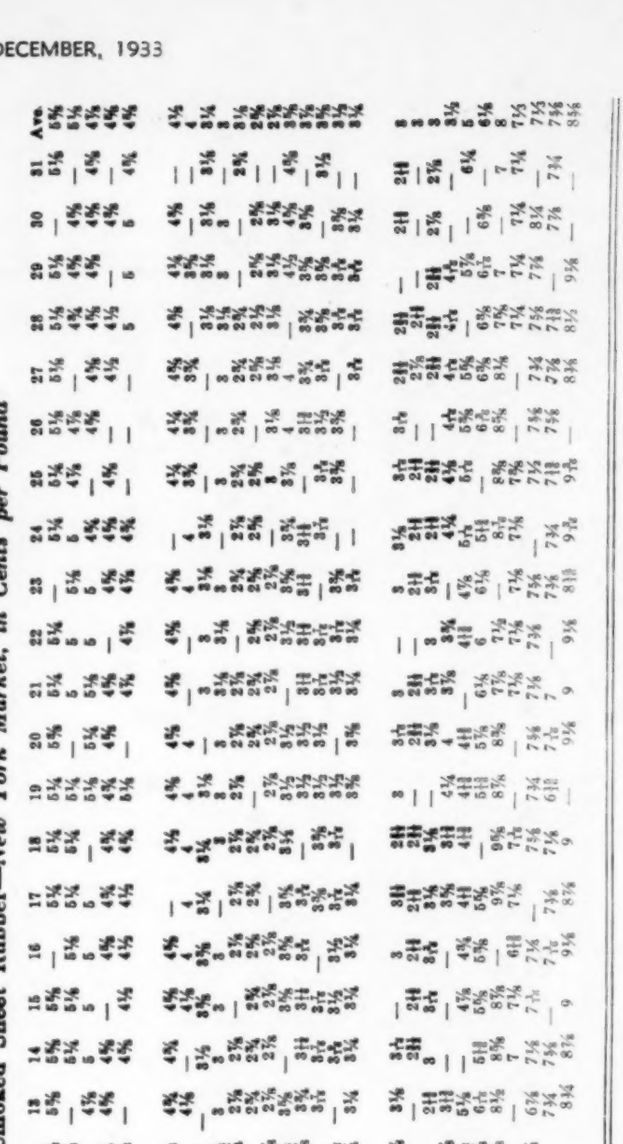
* Stocks on hand at the end of month or year.
(Rubber Manufacturers' Association figures raised to 100%)

U. S. Consumption of Gasoline

(In Thousands of Barrels of 42 Gallons)

	1931	1932	1933		1931	1932	1933
January	26,844	26,038	26,510	August	39,459	35,706	37,426
February ..	26,133	25,378	23,312	September .	36,670	33,828	34,303
March	31,037	29,597	28,227	October ...	35,051	32,680	32,973
April	33,400	31,234	30,176	November .	30,640	29,895	.....
May	35,716	32,016	33,999	December ..	30,529	27,110	.....
June	38,375	39,489	37,710				
July	39,459	30,929	34,458	Total	403,418	373,900	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*



Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1927

Month	1927 Cents	1928 Cents	1929 Cents	1930 Cents	1931 Cents	1932 Cents	1933 Cents
Jan.	38.75	40.25	20.14	15.24	8.34	4.38	3.08
Feb.	38.25	32.75	23.97	15.85	7.70	4.03	2.95
Mar.	41.04	26.82	24.55	15.34	7.71	3.35	3.01
Apr.	40.86	18.97	21.18	14.93	6.43	3.02	3.56
May	40.76	18.99	21.46	14.24	6.49	3.09	4.95
June	37.25	19.59	20.64	12.45	6.35	2.66	6.15
July	34.87	19.40	21.30	11.24	6.37	2.89	8.01
Aug.	35.12	19.46	20.59	9.96	5.38	3.63	7.31
Sept.	33.67	18.47	20.37	8.28	5.08	3.84	7.30
Oct.	34.32	18.83	19.67	8.20	4.87	3.65	7.64
Nov.	37.58	18.26	16.62	9.01	4.65	3.44	8.66
Dec.	40.63	17.97	16.12	9.05	4.64	3.24	—
Average for Year	37.72	22.48	20.55	11.98	6.17	3.49	—

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Sept.	Oct.	Nov.	Dec.	Day	Sept.	Oct.	Nov.	Dec.
1	3¾	—	3⅞	4⅛	17	—	3⅛	4⅜	
2	—	4	3⅛	4⅛	18	3⅛	3⅛	4⅛	
3	—	3⅛	3⅛	—	19	3⅛	3⅛	—	
4	3⅛	4	4	4⅛	20	3⅛	3⅛	4⅜	
5	3⅛	3⅛	—	4¼	21	3⅛	3⅛	4⅜	
6	3⅛	4	3⅛	4⅜	22	3⅛	—	4⅜	
7	3⅝	4	3⅛	4⅜	23	3⅛	3⅛	4⅜	
8	3⅛		3⅛	4⅜	24	—	3⅛	4⅛	
9	3⅞	3⅛	4⅜		25	3⅛	3⅛	4⅛	
10	—	4⅜	4⅞		26	3⅞	3⅛	—	
11	3⅛	4	—		27	3⅛	3⅛	4⅜	
12	3⅛	—	—		28	3⅞	3⅛	4⅜	
13	3⅛	3⅛	4⅜		29	4⅜	—	4⅜	
14	3⅝	3⅛	4⅜		30	4⅜	3⅛	4⅛	
15	3⅛	—	4⅜		31	—	3⅛	—	
16	3⅝	3⅛	4⅞						

Average Monthly Price Per Pound

Month	1930 Pence	1931 Pence	1932 Pence	1933 Pence	Month	1930 Pence	1931 Pence	1932 Pence	1933 Pence
Jan.	7.471	4.160	3.052	2.264	Aug.	4.880	2.385	2.654	3.811
Feb.	7.948	3.823	2.760	2.098	Sept.	4.075	2.524	2.485	3.728
Mar.	7.595	3.822	2.047	2.099	Oct.	4.023	2.898	2.425	3.957
Apr.	7.391	3.082	1.876	2.323	Nov.	4.440	2.890	2.518	4.096
May	6.926	3.035	1.825	2.966	Dec.	4.516	3.115	2.444	—
June	6.195	3.082	1.750	3.392	Average for				
July	5.648	3.048	1.875	3.860	Year	5.926	3.155	2.434	—

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	Oct.	Nov.	Dec.	Date	Oct.	Nov.	Dec.	Date	Oct.	Nov.	Dec.
1	—	9.75	10.20	11	9.55	10.05		21	9.40	10.25	
2	9.90	9.75	10.15	12	—	—		22	—	10.15	
3	9.80	9.80	—	13	9.35	10.10		23	9.50	10.00	
4	9.90	9.75	10.05	14	9.40	10.25		24	9.70	10.10	
5	9.70	—	10.20	15	—	10.25		25	9.90	10.10	
6	9.50	9.55	10.15	16	8.95	10.40		26	9.80	—	
7	9.50	—	10.15	17	9.45	10.20		27	9.85	9.90	
8	—	9.90	10.10	18	9.35	10.15		28	9.75	10.05	
9	9.65	10.05		19	9.35	—		29	—	10.10	
10	9.55	10.05		20	9.40	10.25		30	9.70	—	
								31	9.75	—	

Average Monthly Price Per Pound

	1930 Cents	1931 Cents	1932 Cents	1933 Cents		1930 Cents	1931 Cents	1932 Cents	1933 Cents
Jan.	17.21	10.27	6.65	6.23	Aug.	12.03	7.21	7.43	9.55
Feb.	15.62	10.96	6.85	6.05	Sept.	10.85	6.52	6.30	9.64
Mar.	15.13	10.90	6.86	6.39	Oct.	10.63	6.32	6.30	9.58
Apr.	16.39	10.19	6.16	7.02	Nov.	10.96	6.44	6.22	10.04
May	16.48	9.38	5.72	8.64	Dec.	10.02	6.24	6.00	—
June	14.48	9.05	5.22	9.47	Average for				
July	13.10	9.28	5.87	10.76	Year	13.57	8.56	6.41	—

*Exchanges closed due to Bank Moratorium.

World Stocks of Crude Rubber

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1931	1932	1933	AFLOAT 1931	1932	1933	ON HAND AND AFLOAT 1931	1932	1933
Jan.	209,487	322,860	396,376	56,187	42,234	32,539	265,674	365,094	428,915
Feb.	212,883	322,711	381,794	63,680	51,728	32,898	276,513	373,845	414,692
Mar.	217,804	334,566	390,135	63,133	44,190	29,531	280,937	378,756	419,666
Apr.	228,382	343,099	382,167	56,700	40,387	30,745	285,082	383,486	412,912
May	220,799	346,231	364,623	73,564	50,453	43,342	294,363	396,684	407,965
June	225,536	345,702	333,954	69,421	43,079	63,608	294,957	388,781	397,562
July	234,822	345,927	326,609	66,873	37,894	57,435	301,695	383,821	384,044
Aug.	240,816	357,342	325,148	61,469	41,282	53,084	302,285	398,624	378,232
Sept.	254,324	365,789	334,637	62,420	46,188	57,255	316,744	411,977	391,892
Oct.	273,456	323,823	343,579	68,427	40,176	58,568	341,883	413,999	402,147
Nov.	292,493	377,996	.....	77,443	40,876	.....	369,936	418,875	.....
Dec.	322,826	388,229	.....	53,940	38,360	.....	376,766	426,589	.....

(Rubber Manufacturers' Association figures raised to 100%)

STOCKS IN GREAT BRITAIN

Stocks in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1931	1932	1933	At end of	1931	1932	1933
Jan.	81,093	67,166	36,481	July	81,317	48,842	41,178
Feb.	82,265	65,942	37,182	Aug.	81,560	47,079	39,480
Mar.	84,786	64,280	40,845	Sept.	79,692	44,942	39,237
Apr.	86,831	61,848	40,911	Oct.	76,778	42,327	37,101
May	86,683	56,089	41,998	Nov.	73,911	40,606	.....
June	83,071	51,009	43,032	Dec.	69,470	37,407	.....

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1933					
May	41,478	41,695	41,843	41,969	
June	42,457	42,723	43,361	44,043	
July	43,748	43,319	42,745	42,046	41,161
August	41,211	40,544	40,166	39,237	
September	39,472	39,257	39,191	39,292	39,221
October	38,935	38,565	38,457	37,898	
November	37,170	36,831	36,443	36,360	
December	36,165				

Stocks in Liverpool

1933				
May	55,148	56,139	57,117	56,795	
June	57,560	58,560	59,326	59,272	
July	59,560	59,372	59,135	59,901	58,864
August	58,540	58,391	58,050	57,508	
September	57,266	57,213	56,826	56,625	56,164
October	54,899	54,134	53,500	52,969	
November	52,818	52,910	52,466	52,418	
December	51,894				

STOCKS IN PENANG AND SINGAPORE

(Stocks held by Dealers—Quantities in Long Tons)

End of	1930	1931	1932	1933	End of	1930	1931	1932	1933
Jan.	39,727	48,802	48,850	22,525	July	45,459	51,203	17,017	36,972
Feb.	44,371	49,283	46,954	21,530	Aug.	48,132	48,971	20,649	38,601
Mar.	45,657	49,590	46,591	24,594	Sept.	44,015	47,025	20,415	36,948
Apr.	48,478	45,868	39,663	25,460	Oct	39,930	52,132	23,158	37,282
May	44,715	44,278	38,690	29,822	Nov.	41,674	46,497	25,419	.....
June	42,451	47,517	19,770	34,676	Dec.	45,963	45,795	25,841	.....

STOCKS IN OTHER CENTRES

End of	Malaya Mainland	Afloat for Europe	Holland	Colombo	Para and Manaos
1932:					
Nov.	38,363	21,860	2,229	3,565	5,530
Dec.	40,222	24,430	2,170	3,844	5,552
1933:					
Jan.	38,844	25,080	2,143	4,662	5,676
Feb.	37,323	28,540	2,033	4,210	6,006
Mar.	33,494	26,180	2,183	3,779	5,780
Apr.	33,391	27,710	2,214	3,428	5,204
May	32,613	24,090	1,534	3,177	4,790
June	35,919	22,930	1,147	2,913	4,321
July	35,020	22,900	1,007	3,208	3,830
Aug.	34,463	22,900	1,003	3,411	....
Sept.	33,751	.....	.....	.....	....

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1923	23,140,620	0.6	1928	24,247,282	81.6
1924	21,863,311	19.7	1929	24,141,502	80.3
1925	26,001,664	66.8	1930	17,364,096	80.1
1926	24,199,524	78 8	1931	11,253,800	76.7
1927	19,700,003	79.1	1932	6,004,252	78.7
1933:			1933:		
January	727,308	79.1	July	900,227	—
February	579,789	—	August	960,795	—
March	846,755	—	September	701,302	—
April	898,818	—	October	522,829	—
May	938,083	—	November	506,165	—
June	1,015,181	—	December	———	—

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1925	1926	1927	1928	1929	1930	1931	1932
Production	60,845	61,237	64,439	77,944	68,726	50,965	48,739	40,085
Shipments	59,262	59,002	64,059	74,296	69,395	53,638	48,151	40,260
Inventory[2]	8,142	10,456	10,264	13,624	11,858	9,003	7,775	7,644

Figures for Recent Months

	PRODUCTION 1931	1932	1933	SHIPMENTS 1931	1932	1933	INVENTORY 1931	1932	1933
Jan.	3,675	3,462	2,258	3,744	3,253	2,597	8,957	7,912	7,237
Feb.	3,985	3,871	2,339	3,402	2,553	2,292	9,536	9,172	7,377
Mar.	4,663	3,671	2,038	4,122	2,954	2,092	10,014	9,878	7,290
Apr.	4,944	3,517	3,123	4,932	3,698	3,654	10,031	9,846	6,778
May	5,679	3,820	5,189	5,415	4,258	5,180	10,312	9,379	6,760
June	5,672	5,643	6,100	5,572	10,065	6,305	10,447	4,999	6,618
July	4,926	3,617	5,714	5,462	2,404	5,497	9,919	6,203	6,844
Aug.	3,906	3,089	4,994	4,960	2,655	4,707	8,896	6,659	7,070
Sept.	3,172	2,539	3,999	3,932	3,082	3,503	8,158	6,096	7,595
Oct.	2,974	2,569	.....	2,852	1,799	.....	8,300	6,876	.....
Nov.	2,500	2,304	.....	2,887	1,711	.....	7,919	7,454	.....
Dec.	2,643	1,983	.....	2,781	1,819	.....	7,775	7,644	.....

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1925	1926	1927	1928	1929	1930	1931	1932
Production	82,614	76,618	70,823	80,180	68,829	52,420	48,333	36,801
Shipments	81,004	71,591	72,896	77,127	70,592	54,938	50,021	37,935
Inventory[2]	11,313	16,200	13,692	16,117	12,807	9,999	7,922	6,749

Figures for Recent Months

	PRODUCTION 1931	1932	1933	SHIPMENTS 1931	1932	1933	INVENTORY 1931	1932	1933
Jan.	3,623	3,308	2,093	4,062	3,529	2,535	9,439	7,719	6,197
Feb.	3,916	3,281	2,224	3,400	2,728	2,102	9,921	8,760	6,357
Mar.	4,450	3,502	1,883	3,789	2,686	1,902	10,475	9,448	6,369
Apr.	4,617	3,225	2,853	4,636	3,385	3,051	10,413	9,441	6,189
May	5,413	3,409	4,700	5,281	3,867	4,463	10,459	8,913	6,382
June	5,358	5,279	5,448	5,397	9,019	5,778	10,504	5,174	6,097
July	4,955	2,937	5,603	5,831	2,160	5,211	9,589	5,975	6,440
Aug.	4,435	2,748	4,916	5,301	2,503	4,687	8,774	6,127	6,628
Sept.	3,449	2,601	3,827	4,150	3,098	3,472	8,095	5,753	7,008
Oct.	3,077	2,187	.....	2,813	1,658	.....	8,321	6,214	.....
Nov.	2,443	2,005	.....	2,594	1,578	.....	8,119	6,662	.....
Dec.	2,597	1,779	.....	2,767	1,724	.....	7,922	6,749	.....

(1) **Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% complete up until 1929 and 80% complete beginning with 1929, and that basis has been accepted when preparing the statistics in this table.**

(2) **Held by manufacturers at end of period indicated.**

Automobile Production

	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1926	4,298,799	3,808,753	490,046	205,002	164,483	40,609	4,503,891
1927	3,393,887	2,988,868	453,019	179,426	146,850	32,556	3,573,313
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932							
July	109,143	94,705	14,438	7,472	6,773	699	116,611
Aug.	90,325	75,907	14,418	4,067	3,166	901	94,391
Sept.	84,150	64,748	19,402	2,342	1,741	601	86,483
Oct.	48,702	35,107	13,595	2,923	2,361	562	51,857
Nov.	59,557	47,532	12,025	2,204	1,669	535	61,760
Dec.	107,353	86,149	21,204	2,139	1,561	578	109,542
Total	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933							
Jan.	130,044	108,326	21,718	3,358	2,921	437	133,402
Feb.	106,825	91,492	15,333	3,298	3,025	273	110,123
Mar.	117,949	99,885	18,064	6,632	5,927	705	124,581
Apr.	180,667	153,350	27,317	8,255	6,957	1,298	189,922
May	218,303	184,698	33,605	9,396	8,024	1,372	227,669
June	253,322	211,483	41,839	7,323	6,005	1,318	260,645
July	233,088	195,023	38,065	6,540	5,322	1,218	239,628
Aug.	236,487	195,144	41,343	6,079	4,919	1,160	242,566
Sept.	196,082	160,900	35,182	5,808	4,358	1,450	201,990
Oct.	138,475	108,073	30,402	3,682	2,723	959	142,157

Exports of Crude Rubber from Principal Producing Countries

(Long Tons

	BRITISH MALAYA[1]							DUTCH EAST INDIES[3]							
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[2]	India & Burma[3]	Sarawak[4]	British North Borneo[5]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[5]	Amazon Valley	All Other[5]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,580
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,976	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,551	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1932:															
Mar.	39,903	6,658	33,245	3,462	284	501	460	217	4,946	6,863	6,299	774	715	77	57,843
Apr.	36,670	4,682	31,988	3,210	365	459	345	130	6,722	6,090	4,935	962	487	99	55,792
May	40,297	5,677	34,620	3,824	304	595	344	118	6,552	6,551	6,012	964	416	278	60,578
June	36,566	5,665	30,901	3,444	359	481	345	166	5,610	7,516	5,507	1,218	394	139	56,080
July	40,723	5,346	35,377	3,501	99	442	400	184	5,779	6,257	6,145	1,233	232	141	59,790
Aug.	39,827	7,371	31,956	4,717	129	506	400	300	4,803	4,882	7,244	1,088	303	49	56,377
Sept.	41,973	8,869	33,104	5,238	122	614	400	340	3,858	6,485	7,664	1,621	318	78	59,783
Oct.	37,931	9,798	28,133	2,945	139	583	350	428	4,022	7,051	8,944	1,147	414	247	54,403
Nov.	40,098	10,072	30,026	4,146	185	683	350	371	4,368	6,250	9 080	809	1,164	156	57,588
Dec.	40,118	10,089	30,029	5,801	367	644	350	406	4,683	7,066	8,594	1,211	824	150*	59,493
1933:															
Jan.	46,599	7,857	38,742	4,602	318	590	458	305	4,766	5,630	6,840	1,957	554	125*	58,887
Feb.	37,564	6,167	31,397	5,064	304	541	458	368	4,895	5,119	6,081	895	620	125*	55,867
Mar.	42,059	7,964	34,095	4,905	389	571	458	304	5,092	6,466	6,999	1,102	995	125*	61,501
Apr.	36,752	7,758	28,994	4,582	272	624	583	235	5,226	5,969	8,147	1,122	556	125*	56,435
May	42,902	13,664	29,238	4,643	475	1,091	583	359	6,782	7,298	13,195	1,371	918	125	66,078
June	41,411	16,538	24,873	5,198	377	1,149	582	632	7,352	6,654	14,779	1,369	704	125*	63,794
July	50,531	18,772	31,759	4,551	270	1,358	600*	797	7,367	8,580	16,534	1,310	913	125*	74,164
Aug.	52,266	17,869	34,397	5,692	246	955	600*	926	6,460	7,985	15,161	1,327	800*	125*	74,674
Sept.	49,607	15,146	34,461	5,731		1,027	600*	611	5,868	9,164	15,005	1,159	800*		
Oct.	61,002														

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown when available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States[1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abedf)	Spain (g)	Czechoslovakia (abed)	World Total
1919	228,407	42,671	17,685	5,584	6,295	9,753	9,994	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,748	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,629
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,439	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,790	27,392	18,519	13,277	15,272	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,178
1924	319,103	—11,550	30,446	22,727	14,299	19,571	3,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,370	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	686	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,423	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,099	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,633
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,488	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1932:															
Feb.	26,483	5,930	2,898	4,356	1,723	6,781	1,189	2,931	758	506	500	708	313	306	55,382
Mar.	43,361	3,585	2,482	3,436	2,588	5,398	1,423	2,745	1,211	721	112	456	359	644	68,521
Apr.	36,326	6,826	2,956	3,737	1,600	3,684	1,083	764	1,549	847	348	474	417	1,259	61,870
May	32,818	1,110	2,277	3,447	1,416	3,917	1,033	3,743	2,048	617	286	707	272	350	51,821
June	39,136	1,853	3,666	3,405	2,834	2,834	1,534	5,291	1,421	449	127	578	196	280	63,604
July	30,494	4,082	3,125	3,380	1,529	2,544	1,116	1,735	624	723	—214	784	258	1,207	51,387
Aug.	32,650	6,671	4,919	4,006	970	3,390	1,615	1,740	751	1,211	—66	611	210	557	59,235
Sept.	26,865	3,942	5,845	3,674	2,770	5,878	971	1,376	625	694	103	534	267	406	54,220
Oct.	34,748	2,927	4,715	4,177	1,207	5,653	510	1,853	569	627	553	537	489	986	59,551
Nov.	27,689	4,950	3,830	3,577	1,593	4,563	1,265	1,481	1,653	1,035	275	489	631	650	53,681
Dec.	31,246	1,182	3,205	4,623	941	5,603	2,103	3,720	745	1,298	348	544	485	2,602	57,645
1933:															
Jan.	29,260	3,277	5,858	4,241	1,189	7,611	3,005	1,558	1,275	1,388	308	640	252	338	60,700
Feb	22,970	7,102	6,603	4,460	1,175	8,508	994	2,820	2,001	1,670	375	564	132	681	60,055
Mar.	27,348	8,883	6,093	4,425	1,114	6,035	1,604	2,088	1,904	952	282	649	340	688	62,405
Apr.	20,236	7,765	6,308	4,805	555	5,495	2,215	2,274	1,580	882	163	606	281	400	53,565
May	24,894	11,085	4,144	4,622	1,704	5,289	1,278	1,691	425	710	—525	536	433	432	56,718
June	22,228	8,739	4,056	3,639	1,441	3,330	1,997	2,000	613	469	—519	772	541	400	49,706
July	43,824	3,961	3,774	4,103	1,192	1,460	1,146	2,952	2,347	299	16	486	435	287	66,282
Aug.	43,208	4,330	5,489	4,193	1,795	4,426	1,249	3,312	1,500	325	209	616	606	2,759	74,017
Sept.	43,886	4,341	4,111		2,620						189				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]United States imports of guayule are included in this compilation. *Figure is provisional; final figure will be shown immediately it becomes available.

A Section Devoted to Listings of Leading Producers and Distributors of Raw Materials, Machinery and Equipment, and Supplies for the Rubber Industry.

The Market Place

Chemicals and Compounding Materials — Machinery and Equipment—Crude, Reclaimed and Scrap Rubber—Fabrics—Rubber Products — Consulting Engineers.

Chemicals and Compounding Materials

ACCELERATORS—
Ureka C—Ureka Blend B—Ureka.—A-1, A-7, A-11, A-16, A-19, A-32, Z-88, A-510, DPG
ANTIOXIDANTS — Flectol A, Oxynone
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41 Park Row New York City

CARBON BLACK—*Micronex* the world's standard gas black, universally known as the "King of Rubber Pigments."
Binney & Smith Co.
41 East 42nd St. New York City

CABOT CERTIFIED CARBON BLACK
"Spheron"
Godfrey L. Cabot, Inc.
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CARBON BLACK—*Aerfloted*
Arrow Black for rubber compounding. Standard for grit-free uniformity.
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1790 BROADWAY NEW YORK

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THE MARKET PLACE Section Continued on Next Page